TECHNOLOGY DEPT First Copy

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

First Copy

Construction Methods

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DETROIT

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FLEET OF TRACTOR-SCRAPERS *handles grading on one section of 161-mi. Pennsylvania Turnpike under construction between Harrisburg and Pittsburgh at cost of $61,000,000.*

OCTOBER 1939

$61,000,000 SUPERHIGHWAY — How high-speed grading equipment is handling movement of 24,000,000 cu. yd. of earth and rock on 161-mi. Harrisburg-Pittsburgh four-lane divided route.

RAILROAD RELOCATION — Shasta dam construction in California necessitates new 30-mi. route for Southern Pacific, involving 18 tunnels and 8 bridges.

LOW-COST HOUSING — Large sheets of fiber insulating board, protected by semi-plastic paint compound, form walls of buildings in Greensboro, N. C. project.

A TRACTOR OPERATOR SPEAKS — Man in driver's seat tells how output can be stepped up by reducing noise, heat, dust and correcting conditions that cause fatigue.

Insure interest in your exhibit at the Road Show. Make them want to look over your equipment by giving it attractive display and complete description in the advertising pages of

The Highway Number

ENGINEERING NEWS-RECORD

January 18

●

The Road Builders' Number

CONSTRUCTION METHODS

January

Yearly, the world's biggest eyeful of what's new in the methods and equipment of road building • street building • highway building • bridge building • vehicular tunnel building grade crossing elimination.

If you aren't exhibiting at the Road Show of course that's all the more reason for your being in the advertising pages of these important volumes of road-building literature.

TECHNOLOGY DEPT.

CURRENT JOBS

.... and Who's Doing Them

HEAVY CONSTRUCTION

Biggest job of the month was the Friant dam of the U. S. Bureau of Reclamation's Central Valley project in California, on which low bidder was **Griffith Co. and Bent**, of Los Angeles, with a tender of $8,715,358. On the Stevens dam (formally Mud Mountain dam) near Seattle, Wash., low bid of $5,344,000 was submitted by **G. F. Atkinson Co.**, of San Francisco. Another big bid of $6,436,855 was submitted by **Healy Subway Construction Corp.**, for a twin shield-driven tunnel section, 4,500 ft. long, of Chicago's new subway. Military preparedness activities are reflected in the award of the first contract for new and enlarged naval air bases in the Pacific Ocean, by the Bureau of Yards & Docks, U. S. Navy. Contract on cost-plus-fixed-fee basis, with fee of $898,000 on work estimated at $14,600,000, went to combination made up of **Hawaiian Dredging Co.**, Honolulu, **Raymond Concrete Pile Co.**, and **Turner Construction Co.**, both of New York; projects include construction at five sites. **Great Lakes Dredge & Dock Co.**, of Chicago, received $1,435,000 contract for dredging in Calcasieu River, Louisiana. **Coleman Bros. Corp.**, of Boston, were successful bidders, with price of $4,265,863, for Franklin Falls dam, in New Hampshire. On Loyalhanna dam at Saltsburg, Pa., work costing $1,371,710 will be started by **Great Lakes Dredge & Dock Co.**, of Chicago On Ashnelot River, in New Hampshire, Surry Mountain dam will be built by **A. I. Savin Construction Co.**, for $890,160. Timber trestle across Red River near Denison, Tex., went to **G. W. Condon Co.**, of Omaha, Neb., for $761,450. At Auburn, Calif., **G. Pollock Co.**, of Sacramento, will build the Ruck-A-Chucky dam for $643,450. In Utah, contract for pipe line and structures on Provo River project was awarded to **Utah Concrete Pipe Co.**, of Salt Lake City, for $522,353.

Bids submitted on various schedules on the Santee-Cooper project in South Carolina, include the following: Schedule 2, **Wilbanks & Pierce, Inc.**, of Greenville, Miss., $2,420,267; Schedule 3, **McCarthy Improvement Co.**, of Davenport, Ia., $3,081,690; Schedule 4, **Virginia Bridge Co.**, Roanoke, Va., $222,500; Schedule 5, 6 and 7, **United Construction Co.**, Winona, Minn., respectively $3,625,636, $5,799,712 and $6,021,895. For the 240-mi. 16-in. gas line for the Northern Natural Gas Co., in Iowa and Minnesota, costing $15,000,000, contracts were awarded to **C. L. Foreman** and the **Truman-Smith Construction Co.**, both of Kansas City. Another 280-mi. gasoline pipe line in Nebraska and Iowa went to **B & M Construction Corp.**, of Oklahoma City, and **H. C. Price Welding Co.**, of Bartlesville, Okla. Low bidder for section of subway in Brooklyn, N. Y., was **A. A. Johnson and Necaro Co.**, of Long Island City, N. Y., with price of $2,347,000. In Chicago, low bidder on section of new subway was **N. J. Boyle & Co.**, local contractor, with price of $2,986,590.

SEWERS — BRIDGES — HIGHWAYS

Large sewer contracts were awarded as follows: Jamaica, N. Y., $1,387,997, to **George F. Driscoll Co.**, of Brooklyn. Hyattsville, Md., $1,259,000 to **Virginia Engineering Co.**, Newport News, Va. South St Paul, Minn., $901,974 to **D. W. Hickey & Co.**, of St. Paul. Washington, D. C., $801,120 to **Stiers Bros. Construction Co.**, of St. Louis, Mo. Gary, Ind., $688,162 to **J. C. Bontrager**, of Elkhart, Ind. East Rutherford, N. J., $640,826 to **Industrial Engineering Co.**, of New York.

Grade separation structures in Queens County, N. Y., were awarded to **Tomasetti Contracting Co.**, of Brooklyn, for $1,024,578. Susquehanna River bridge at Havre de Grace, Md., will be built for $500,000, by **McLean Contracting Co.**, of Baltimore.

For the Shore Parkway in Brooklyn, N. Y., contracts were awarded as follows: $418,531 to **Federal Construction Co.**, of New York City; $455,036 to **Elmhurst Contracting Co.**, of Elmhurst, N. Y.; $397,611 to **P. J. Carlin Construction Co.**, of New York City.

BUILDINGS

Public — Successful bidder on Mission Hill housing project, Roxbury, Mass., was **Rugo Construction Co.**, of Boston, with price of $3,286,000. Another mass housing project in Boston, Mass., was bid in by **Bowen Co.**, of Boston, for $3,377,000. **James Mitchell, Inc.**, of Jersey City, N. J., will build a $2,212,000 hospital building in that city. In Birmingham, Ala., Eleyton Village housing project was awarded to **J. A. Jones Construction Co.**, for $2,911,000. **Federal Construction Co.** will build a $1,449,000 high school in Brooklyn, N. Y. **Skilken Bros.**, will build the $1,554,945 Washington Manor housing project in Charleston, W. Va. In Washington, D. C., housing project costing $1,360,000 will be started by **J. McShain, Inc.**, of Baltimore.

Industrial — Airplane motor plant subsidiary of General Motors Corp., is under construction in Indianapolis, Ind., by **Austin Co.**, of Cleveland, Ohio, at cost of $6,000,000. In Boston, Mass., **United Engineers & Constructors**, of Philadelphia, Pa., will build a $4,000,000 electric generating plant in Cayuga, Tex. Oil refinery costing $1,500,000 is under construction by **Frick-Reid Co.**, of Tulsa, Okla. National Biscuit Co., has engaged **George A. Fuller Co.**, of Washington, D. C., to build a $1,500,000 plant in Atlanta, Ga. For a generating plant at LaCrosse, Wis., **Hoeppner-Bartlett Co.**, of Eau Claire, Wis., bid $1,560,083. At Belleville, N. J., plant for Andrew Jergens Co., to cost $1,000,000 is under construction by **James Stewart Co.**, of New York City.

OCTOBER, 1939
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Construction Methods
A Pictorial Survey of Current Practice, Equipment and Materials
Robert K. Toublin, Editor
A. E. Paxton, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington), Nelle Fitzgerald
A McGRAW-HILL PUBLICATION

With this issue CONSTRUCTION METHODS reverts to the shorter name it used prior to 1937, and makes its bow in a new format and type dress, designed by Lester Beall, New York City typographic and art consultant, to produce a magazine meeting these specifications: Modern in form; attractive in physical appearance; easy to read; and of greater usefulness to the field it serves. In our own belief that Construction Methods has benefitted substantially by these changes, we hope our readers will concur. — EDITOR.

The HOW of it

How **HIGH SPEED GRADING** on 161-mi. turnpike is handled by modern equipment. — p. 44

How **RAILROAD RELOCATION** at Shasta dam involves 12 tunnels and 8 bridges on 30-mi. line. — p. 49

How **STEEL FALSEWORK** is employed to erect railroad truss bridge. — p. 56

How **TRACTOR-CRANE** dismantled abandoned saw mill. — p. 56

How **COTTON FABRIC** is applied to bituminous paving at airport by special cart. — p. 56

How **TRUCK ENGINES** were changed from gas to diesel. — p. 57

How **FLOODLIGHTING** was aided by portable towers. — p. 57

How **MORTAR JOINTS** in concrete block wall construction should be made. — p. 57

How **DOUBLE DUTY** in digging trench and laying pipe was performed by dragshovel. — p. 57

How **DIAMOND DRILLS** explored rock strata in tunnels. — p. 58

How **MORE YARDAGE** can be obtained from earth-handling equipment. — p. 59

How **CONCRETE CAISSONS** were sunk to support engine house foundation. — p. 63

How **LOW-COST HOUSES** were built with fibre board siding covered by semi-plastic paint. — p. 66

How **NAIL HOLES** are filled with plastic material. — p. 67

How **WIDENING OF DRAW SPAN** was done by jacking trusses apart. — p. 68

How **STABILIZER PLANT** furnished clay-gravel for road construction. — p. 71

CONSTRUCTION METHODS. October, 1939. Volume 21. Number 10. Published Monthly, price 20¢ a copy. Subscription rates — United States, Canada, Mexico and Central and South American countries, $1.00 a year; three years for $2.00. All other countries, $2.00 a year or 8 shillings. Entered (or reentered) as second class matter December 16, 1936 at the Post Office at New York, N. Y. under the act of March 3rd, 1879. Printed in U.S.A. Cable address: "McGrawhill, New York." Member of A.B.P. Member of A.B.C. Contents Copyrighted 1939 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York, N. Y.

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BUSINESS
Stands Against War

Let us take a clear-eyed look at this thing we call War.

WAR is a political tool for domination or suppression; a device of futility—unless it be waged in defense of our homes, our property or our rights—in the preservation of our liberty. War destroys everything it touches. So completely does it disrupt the order and progress of civilization that humanity falters.

Dangerously widespread amongst our people today is the assumption that our participation in the European War is inevitable. Some mistrust the temper and program of the federal government as likely to lead us into it; others fear that our sympathies will make us an easy prey to the propagandists; still others suspect that business and industry, in a blind greed for profits, may involve us in the conflict.

To give credence to such beliefs is to deny that we are normal individuals, endowed with intelligence and a will, or the ability, as a people, to profit by our own experience. In all human experience, death only is inevitable.

To say that Industry and Business want war or will encourage, directly or indirectly, our participation in the present war, is a vicious and deliberate lie.

The millions of us who, since the World War twenty-five years ago, have devoted all our efforts and energies to creating and building and improving that which we know today as American Industry and Business, are convinced that the destiny of this country can be wrought only in peace. We cannot, and *must* not, stand aside and watch even the little progress we have made since that war sacrificed to the pestilence of another world conflict. We who are trying to build a lasting heritage for those who will follow us truly know that "there never was a good war or a bad peace".

Perhaps it is time to re-emphasize two of the three elements of our democratic faith, so simply stated by Abraham Lincoln, "that government of the people, by the people, for the people, shall not perish from the earth". Now, of all times, it will be wise to inform our political stewards that government by the people and for the people must be the guiding principle in what they do during the days to come, and that it is our *will* that in our country peace shall be preserved.

Only the grim and solitary courage of each of us, the determination to exert all our intelligence, all our individual influence in every way, can insure the preservation of peace for our country.

Preparedness we know to be the most effective preventive weapon against the threat of war. We must be certain, therefore, that we provide our air, land and sea forces with the best in armaments and material, in adequate supply to maintain properly and impressively our national responsibilities and defense.

Most important is that we as individuals, thus inspired, band together to exert the full strength of Industry and Business in the maintenance of peace.

If we are to succeed, we must be forceful, we must be articulate. To that purpose we pledge ourselves and the resources of our publications. An expression from our readers will greatly assist in such a mobilization of industrial opinion. Together, in this critical time, we can serve America well!

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This message is appearing in all McGraw-Hill industrial and business publications, reaching over a million readers.

Warning

COLD NIGHTS JUST AHEAD —PLAY SAFE...USE 'INCOR'

WHEN Winter sets in and weather gets really cold, you're all set for it. But these sunny Fall days fool you; nights turn cold when you least expect it. Down goes the thermometer . . . and, unless you're prepared, frost may nip the concrete.

Be on the safe side. Use 'Incor' 24-Hour Cement . . . heat the mixing water . . . to avoid heat loss, protect the concrete promptly after placing. For 24-hour service strength, supply heat in order to maintain curing temperature at about 70°.

'Incor', a more thoroughly processed Portland cement, is service strong and safe from freezing in one-fifth the usual time. That saves heating expense, cuts winter costs all along the line.

Dependable high early strength plus long-time durability — proved by 'Incor's 12-year service record. Figure 'Incor' cold-weather savings on jobs already under way or about to start. Use 'Incor'* this Winter—you'll be money ahead if you do. Write for copy of "Cold-Weather Concreting." Lone Star Cement Corporation, Room 2264, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.

Sales Offices: ALBANY, BIRMINGHAM, BOSTON, CHICAGO, DALLAS, HOUSTON, INDIANAPOLIS, JACKSON, MISS.; KANSAS CITY, NEW ORLEANS, NEW YORK, NORFOLK, PHILADELPHIA, ST. LOUIS, WASHINGTON, D. C.

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For Digging Value

"LOOK INSIDE THE CAB"

ALL BAY CITY machines from ⅜ to 1¼ yards with crane capacities up to 20 tons follow the same proven basic design, and are carefully engineered to give biggest digging value. Look inside the cab — note the sturdy, simple, compact construction that delivers greatest power to the working end — where power counts in added yardage. A few of the outstanding BAY CITY advantages are listed on this page. Look them over, then write for attractive 32-page illustrated Catalog H-2. No obligation to learn more about these fast, powerful, easy-to-operate machines.

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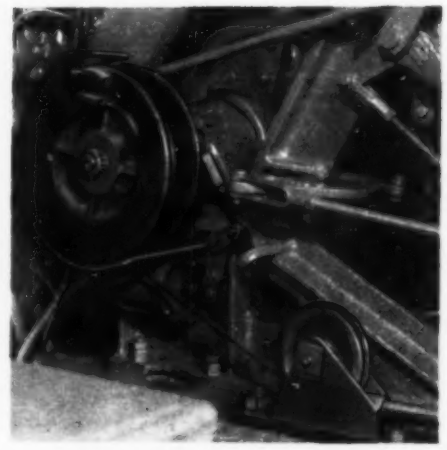
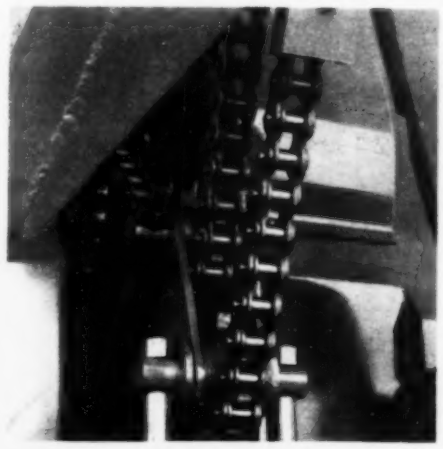
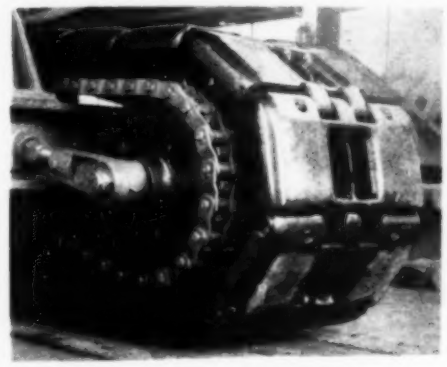


☛ **The effectiveness of this instantaneous Electric Dipper Trip adds from 10 to 25% to daily yardage — and there's no extra charge.**



☛ **Not only independent and positive but a *one-piece* continuous chain crowd from front drum to shipper shaft — a money saving feature.**

Illustrating 20 ton Crane of John S. Geiger's Sons excavating Ways at Newark, N. J. — a job of fine grading handled with a Clamshell.

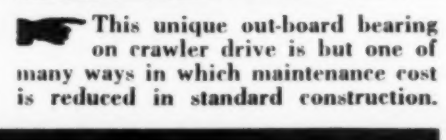


☛ **Power operated, booster clutches give easier operation without operation fatigue. Actuated by short lever throw without effort.**

☛ **Straddle dipper sticks with welded crowd racking and sturdy electric welded box type boom.**

☛ **One-piece unit-cast alloy steel carbody and revolving table absorbs shock and vibration — no deadweight.**

☛ **All Bay City full revolving shovels are fully convertible without machinery changes—no extra gadgets, drums, chains, etc., to buy — Just change front end attachment.**



☛ **This unique out-board bearing on crawler drive is but one of many ways in which maintenance cost is reduced in standard construction.**

BAY CITY SHOVELS

EUCLIDS...
The Turnpike's Choice For
HAULING

Over the new Pittsburgh to Harrisburg Turnpike, through the rugged wilderness of the Pennsylvania mountains, modern construction magic is rapidly creating this great super-highway. On the hauling end are Euclids . . . . nearly 100 of them . . . . protecting yardage estimates on every contract through their superior, continuous performance. The adjoining views are from the 7-mile stretch under construction by the Central Pennsylvania Quarry Stripping Construction Co., who are using Euclids practically 100%. They recently added 17 big Rear-Dump units, several of which are seen here in action. Visit, if you can, this great project . . . . it's worth it. Further, let us send you some very interesting time studies covering Euclid performance on the Turnpike.

There Are Approximately **100 EUCLIDS** *on the Turnpike*

THE EUCLID ROAD MACHINERY CO.
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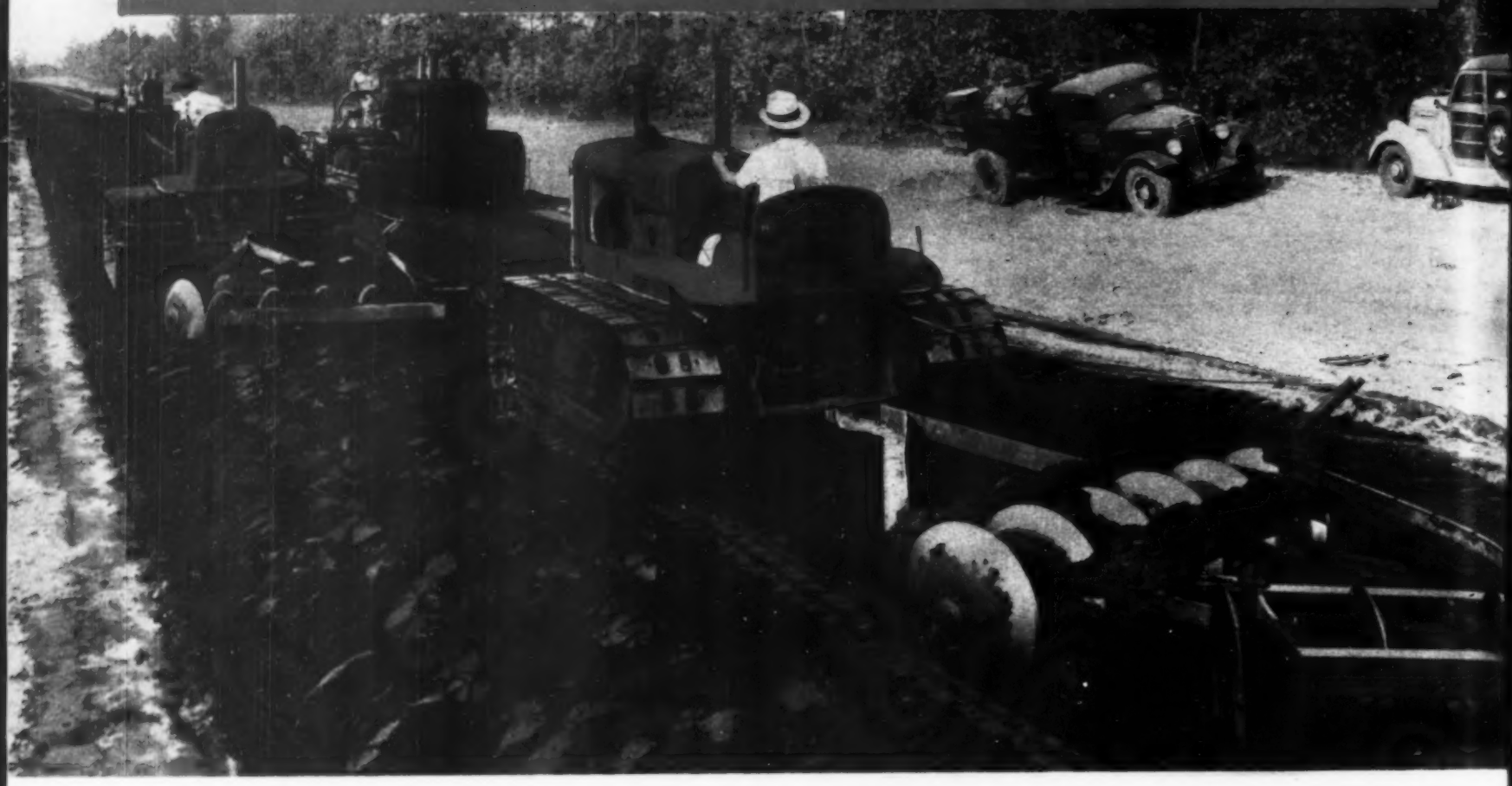
EUCLID
THE PIONEER

ELEVEN TRACTRACTORS ON THE JOB FOR SMITH ENGINEERING OF PENSACOLA



"MAINTENANCE COSTS are less on International TracTracTors than on others we have had experience with, and they are easier for the mechanics to work on," says M. J. Gonzales, superintendent for the Smith Engineering and Construction Co., Pensacola, Fla.

"The abrasive action of the sand we work in down here is very hard on track rollers, track chains, driving sprockets, and front idlers. These parts certainly stand up well on TracTracTors. I like the design of TracTracTor rollers, too, and I find they last at least three years. In my opinion, that's a mighty fine record."

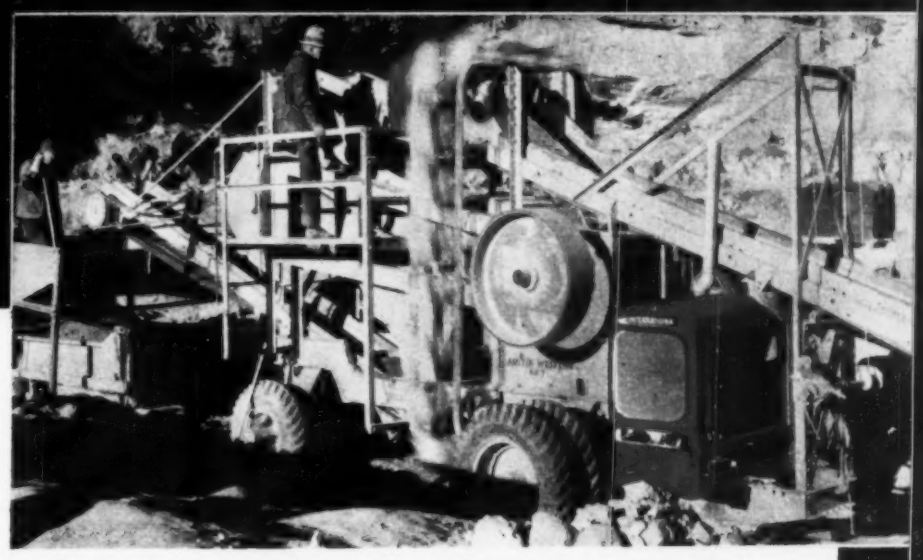
Four International TracTracTors were purchased by the Smith company in November, 1933. Today they have a fleet of eleven, consisting of nine TD-40 Diesel and T-40 (gasoline) TracTracTors, and two new TD-18 Diesels purchased this year. They also own eight International Trucks, and other International Harvester equipment.

The Smith company is a pioneer in sand-bituminous road-mix construction. These pictures show mixed-in-place paving of the new Florida State Route No. 39, north of Ebro. The 70 h.p. TD-18 (see both pictures)

operated a specially built, large-capacity mixing machine. Six other TracTracTors (some of which are shown in the top picture) were used on this job also, to operate special 8-ft. offset disk harrows and 12-ft. graders.

INTERNATIONAL

Save Money All the Way Around with INTERNATIONAL Power



An International-powered portable crushing and screening plant owned by Mesa County, Colo., operating near Malina. This outfit has a capacity of 270 yards of 1-inch material in 8 hours.

POWER that's in there getting results every minute, that stands up to the toughest jobs—*that's* INTERNATIONAL Power. More and more users are getting this power on their side—turning the *economy, stamina, dependability,* and *long life* of International TracTracTors, Wheel Tractors, and Power Units *into profits for themselves.*

The more you see these outfits at work, the more you'll appreciate how International Harvester's sound engineering and quality construction pay out on the job. The features built into every model in the line add up to *more work per day* and *important savings on every operation.*

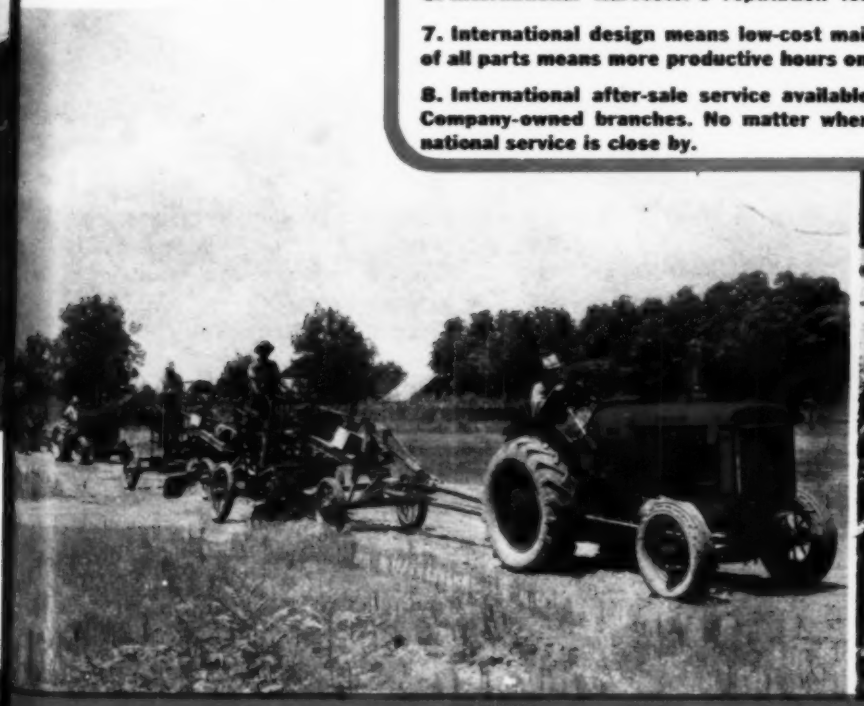
Get first-hand information on International Tractors and Engines yourself. Watch them at work and talk to owners. Check their performance and economy any way you like. Ask the nearby International industrial power dealer or Company-owned branch for a demonstration and full information. Then you'll realize why the tide is turning to INTERNATIONAL.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue **Chicago, Illinois**

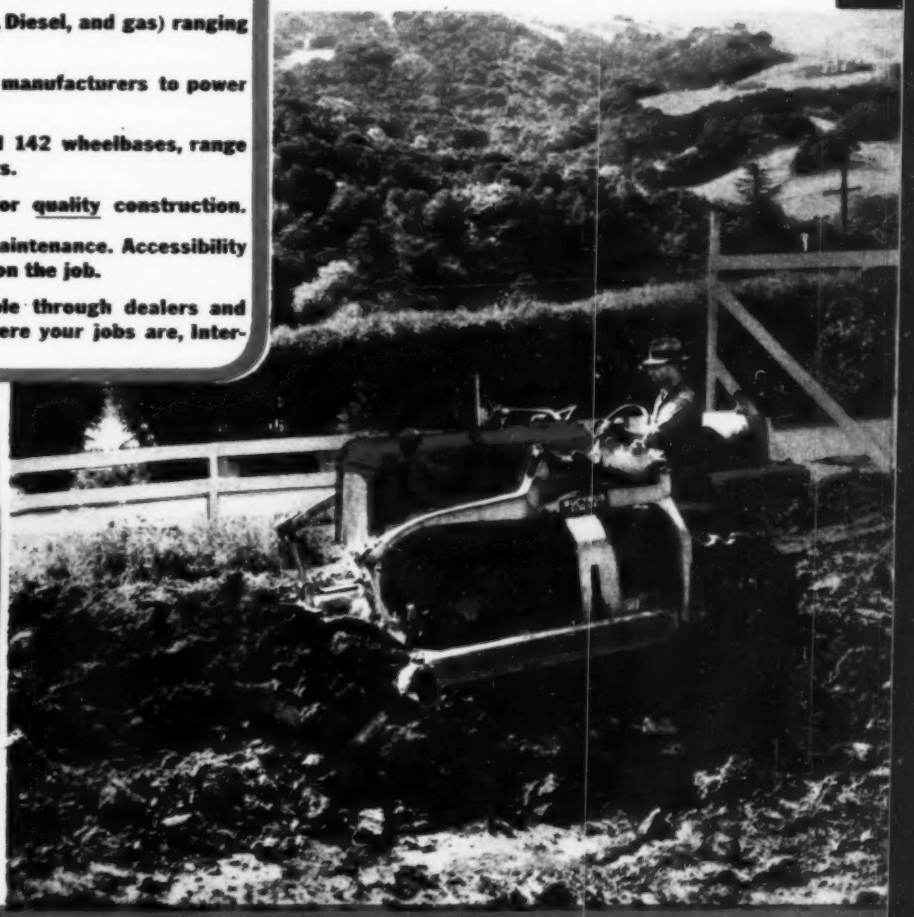
8 REASONS WHY IT IS GOOD BUSINESS TO STANDARDIZE ON INTERNATIONAL

1. **Six TracTracTors (gasoline and Diesel), up to 70 h.p. (drawbar).**
2. **Five wheel-type tractors (gasoline and Diesel). The Model ID-40 is the only Diesel-powered industrial wheel tractor on the market.**
3. **Eleven models of power units (gasoline, Diesel, and gas) ranging up to 110 max. h.p.**
4. **Modified units available to equipment manufacturers to power a wide variety of allied equipment.**
5. **International Trucks in 42 models and 142 wheelbases, range from ½-ton units to powerful Six-Wheelers.**
6. **International Harvester's reputation for quality construction.**
7. **International design means low-cost maintenance. Accessibility of all parts means more productive hours on the job.**
8. **International after-sale service available through dealers and Company-owned branches. No matter where your jobs are, International service is close by.**

Below: These two big International I-40 Tractors are used very effectively by Mitchell County, Ga., in maintaining its 1,600 miles of highways. Each tractor pulls an 8-foot and 10-foot grader in tandem.



Below: Ted Oliveira, Lafayette, Calif., contractor, does a variety of work with his International T-20 TracTracTor. Here it is excavating a basement for a school.

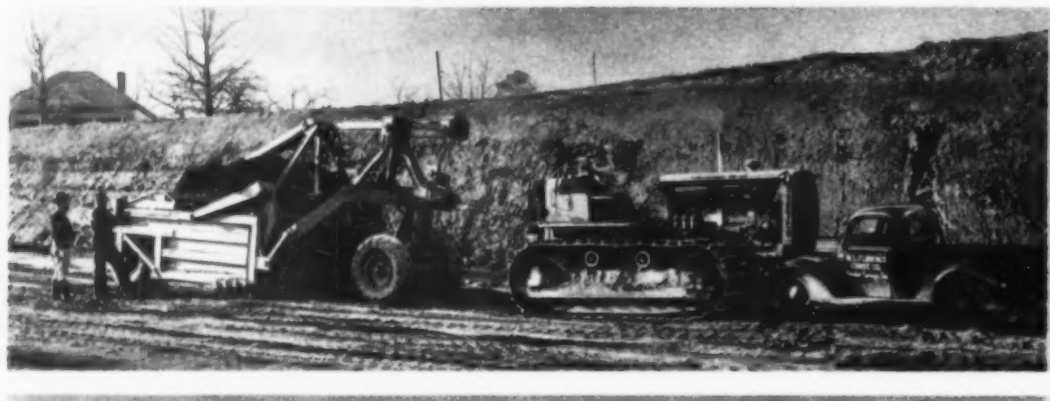


Industrial Power

ROAD CONTRACTOR COMPLETES BIG JOB

AHEAD OF SCHEDULE!

One of the W. L. Florence power shovels in action . . . with Buck Jenkins in charge. Texaco Crater Compound keeps the wire ropes and heavy gears in condition despite dust and heat.



Caterpillar Tractor and Le Tourneau Scraper on the Greenville-Spartanburg super-highway job. Texaco fuels and lubricants kept these units working at peak efficiency.

The Florence Co.'s trucks use Insulated Texaco Motor Oil, Insulated Havoline, Texaco Marfak, Texaco Thuban, and are fueled with Texaco *Fire-Chief* Gasoline.

Contractor: W. L. Florence Construction Co., Powder Springs, Georgia.

Job: 32 miles of highway in So. Carolina.

Time: Shortest possible. None to lose.

Equipment: 19 pieces of road building machinery and 25 International and Ford trucks.

Fuel and Lubricants: TEXACO 100%.

Result: Job completed ahead of schedule.

EXPERIENCED lubrication engineers, trained in the selection and application of Texaco Automotive Lubricants, will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

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AMERICAN BOSCH CORPORATION
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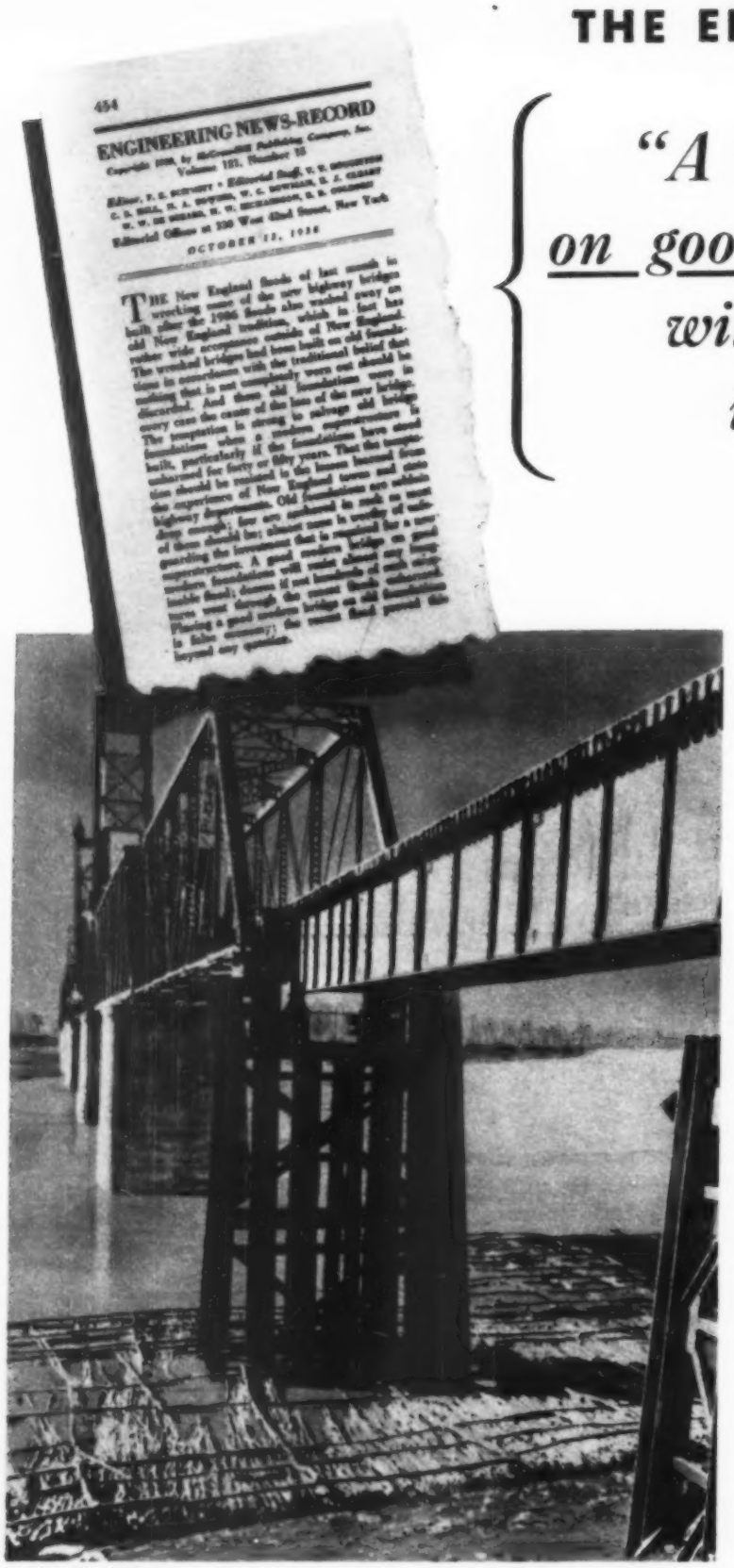
AMERICAN BOSCH

Fuel Injection Equipment

STANDARD OF AMERICA — WORLD WIDE SERVICE

THE EDITORS SAY IT FOR US: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ENGINEERING NEWS-RECORD
OCTOBER 12, 1938
THE New England floods of last month in wrecking some of the new highway bridges built after the 1936 floods also washed away an old New England tradition, which in fact has rather wide acceptance outside of New England. The washed bridges had been built on old foundations in accordance with the traditional belief that nothing that is not completely worn out should be discarded. And these old foundations were in every case the cause of the loss of the new bridge. The temptation is strong to salvage old bridge foundations when a modern superstructure is built, particularly if the foundations have stood unharmed for forty or fifty years. That the temptation should be resisted in the future instead of that the experience of New England towns and cities highway departments. Old foundations are seldom deep enough; few are anchored in rock as most of them should be; almost none is wholly of safe guarding the investment that is required for a new superstructure. A good modern bridge on good modern foundations with water channel of adequate stable flood; dozens if not hundreds of such bridges were swept through the current floods. Placing a good modern bridge on old foundations is false economy; the recent flood proved this beyond any question.

U·S·S Steel Bearing Pile **installation on Missouri Pacific Railroad Bridge No. 87, over the Arkansas River near Yancopin, Arkansas. Here high load-bearing capacity and dependable protection against high water and scour are needed. U·S·S Steel Bearing Piles supply both.**

"A good modern bridge, on good modern foundations, will resist almost any imaginable flood"

Now read what the editor of* Railway Engineering and Maintenance *says. In the February issue, under the caption — "STEEL PILES—Valuable for Anchoring Substructures," he writes:—

"DURING the last ten or more years steel bearing piles have been employed in increasing numbers in prominent highway structures and in a few sizable railway structures.

"Most of the railway installations have been for pier or abutment footings in river or stream beds, in an effort to secure sufficient penetration, either to insure adequate bearing capacity or to protect against scour. In rebuilding structures over waterways subject to severe wash, the H-type piling has been driven to depths of 75 ft. below the river bed as foundations for concrete piers and abutments, either through soft material to a solid footing, or through sand, gravel and shale to depths far beyond any possibility of dangerous exposure by scour.

"In the H-type pile, engineers are finding a secure means of anchorage for substructures in unstable materials of great depth—and in hard-driving materials, which while possessing adequate load-supporting power in themselves, when undisturbed, are subject to erosion and wash under extreme runoff conditions. In these respects, they have found in the steel pile a valuable ally in their constant struggle against fast water and shifting river beds.

"With sufficient column strength to carry their load, even when unsupported laterally for considerable depths, the security steel piles afford appears to be fool proof. Many installations of 30 or 40 years' standing indicate a service life of 100 years or more."

Few indeed are the foundation jobs where economical and practical considerations are not better served by U·S·S Steel Bearing Piles. They offer you the strongest, most permanent, most easily driven form of bearing piles you can use. They are available from an unfailing and convenient source of supply.

USS

This symbol represents the highest quality, the finest metallurgical service.

STEEL BEARING PILES

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

NO OTHER CRAWLER LIKE THIS
Travel gears and clutches are fully enclosed and run in oil.
The base—a massive steel casting—internal teeth in the ring gear made by stripper plate process, can be heat treated to a hardness impracticable in a cat tooth.
Material is squeezed out of this roller path by the action of the rollers making the crawlers virtually self cleaning.
Ball and socket action of roller and tread permit the crawler belt to suit itself to the terrain.
NORTHWEST
Shovels • Cranes • Draglines • Pullshovels • Skimmers
BUILT to help you Earn MORE MONEY!

NORTHWEST — the outstanding crawler in the shovel, crane and dragline industry. Simple in design, easily cared for, smooth in operation, trouble free! Treads are smooth at the joints — alloy steel, heat treated — no nut cracker, stone crusher action and they travel without damaging pavement.

A large number of crawler rollers assure a better distribution of load over the entire crawler — Northwest treads can't buckle up between rollers when crossing rails or crawling over timbers or stones.

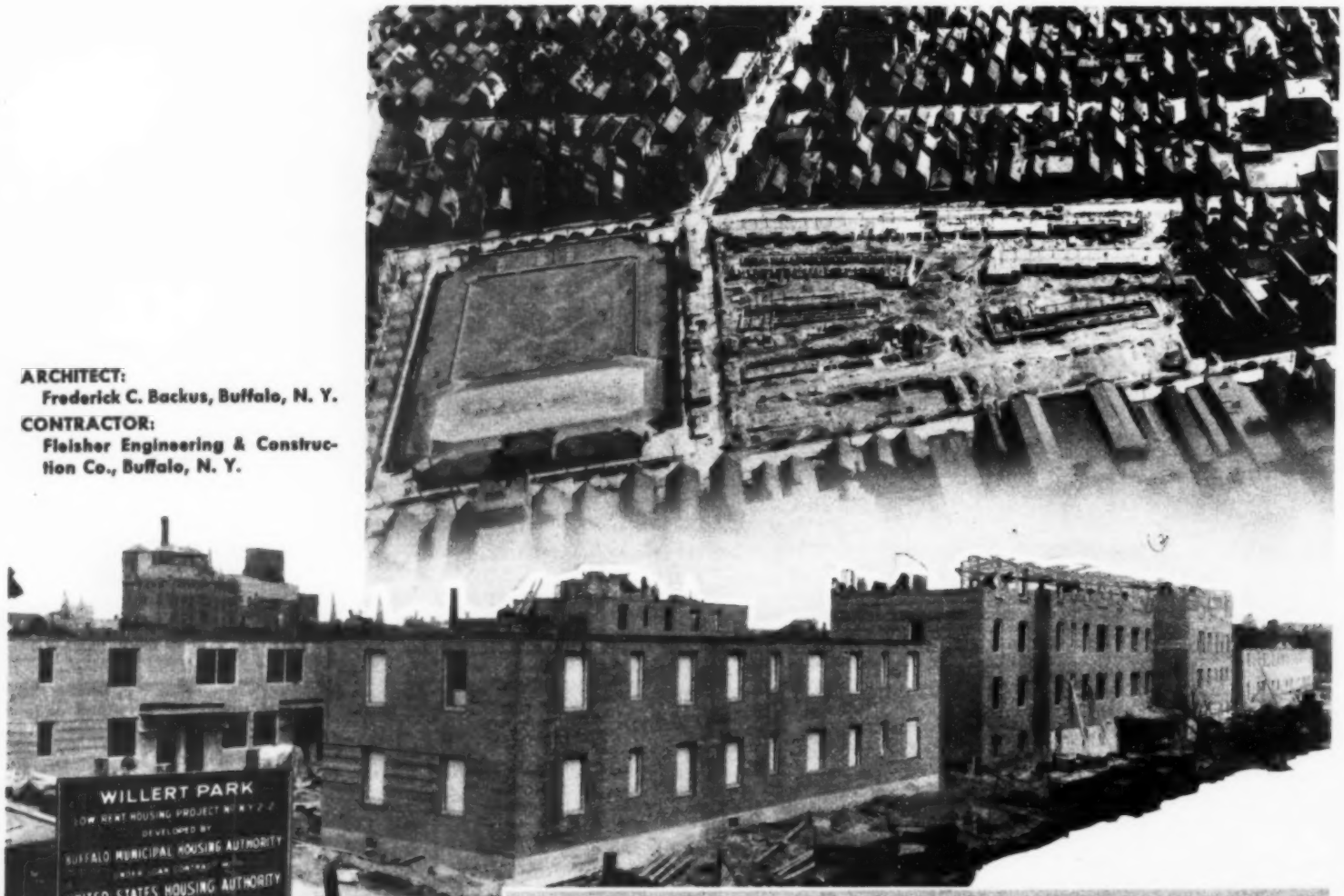
Crawlers are unusually long, providing for low ground bearing pressure. Side frames are rugged, all welded members, and are closed on top to assure maximum protection for rollers.

Foolproof, dependable—backed by nearly 20 years of service in the hands of the nation's leading contractors.

NORTHWEST ENGINEERING CO.
1728 Steger Building 28 E. Jackson Boulevard
Chicago Illinois

ARCHITECT:
Frederick C. Backus, Buffalo, N. Y.

CONTRACTOR:
Fleisher Engineering & Construction Co., Buffalo, N. Y.



LEHIGH
EARLY STRENGTH
CEMENT

Results like these are possible because in 24 to 48 hours the strength of Lehigh Early Strength Cement is equal to that of normal cement at 7 days. This speed can be applied to any type of concrete work, winter or summer.

The Lehigh Service Department will gladly answer your questions.

LEHIGH PORTLAND CEMENT COMPANY
Allentown, Pa. Chicago, Ill. Spokane, Wash.

WINTER OR SUMMER
This Contractor Saves Money

Contractors all over the country are having profitable experiences with Lehigh Early Strength Cement like those of Fleisher Engineering & Construction Company, who say:

> ". . . we were required to carry on work in cold weather —only 250 calendar days had been allowed for completion. We were confronted with the problem of providing temporary heat for winter protection of concrete—we decided that by using Lehigh Early Strength Cement we could strip slabs within 3 days from the date they were poured, thereby cutting down the period of protection and at the same time making these slabs available for the brick masonry operation."

Referring to subsequent work on the same job they say:

> "On May 17 we poured a first floor slab, about 4800 sq. ft. The following day, May 18, 23 bricklayers were working on this same slab. We have convinced ourselves that money can be saved by using Lehigh Early Strength Cement in warm weather, too. It is possible to strip slabs much faster than with ordinary cement, thereby making it possible to get more uses out of form lumber, which results in a large saving, not only of lumber but of carpenter work in making up of beam sides, beam bottoms, and panels for slabs."

PENNSYLVANIA TURNPIKE CONTRACTORS

Extend Carryall* Savings

over 30% greater work range

More than 3 LeTourneau Tractor Tools have been sold on the Pennsylvania Turnpike Project to every one rented or sold under all other manufacturers' names. LeTourneau's complete earth moving package of Rooters* and 'Dozers spread Carryall Scraper savings over a wider range of work than other tools. This combination's ability to produce profits at lower bid prices under conditions that stop others has helped more than half the turnpike contractors win grading contracts.

Ask your LeTourneau and "Caterpillar" dealer for a copy of the turnpike equipment summary. Then ask for a demonstration and you will really appreciate why it is LeTourneau more than 3 to 1 all over the country. R. G. LETOURNEAU, INC., Peoria, Illinois; Stockton, California. Cable address, "Bobletorno."

LETOURNEAU

ROOTERS* 'DOZERS CARRYALLS*

POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, CRANES, TREEDOZERS.

*Name Reg. U. S. Pat. Off.

COAST-TO-COAST SERVICE

on Bethlehem Reinforcing Bars

Major construction areas throughout the country are supplied promptly with reinforcing materials by fifteen Bethlehem warehouses located in key cities.

Each of these Bethlehem warehouses has a complete stock of reinforcing steel. Most warehouses maintain up-to-date shearing and bending equipment, so that reinforcing bars can be cut to length and bent to shape to meet the specifications on your order.

You'll appreciate Bethlehem service, too, because at every warehouse there's an alert, efficient organization ready to ship your order promptly.

Get in touch with the Bethlehem office nearest you the next time you want reinforcing steel.

BETHLEHEM STEEL COMPANY, General Offices: Bethlehem, Pa. District Offices: Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Denver, Detroit, Honolulu, Houston, Indianapolis, Johnstown, Pa., Kansas City, Mo., Los Angeles, Louisville, Milwaukee, Nashville, New Haven, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, Salt Lake City, San Antonio, San Francisco, Savannah, Seattle, Springfield, Mass., Syracuse, Toledo, Tulsa, Washington, Wilkes-Barre, York. Export Distributor: Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL COMPANY

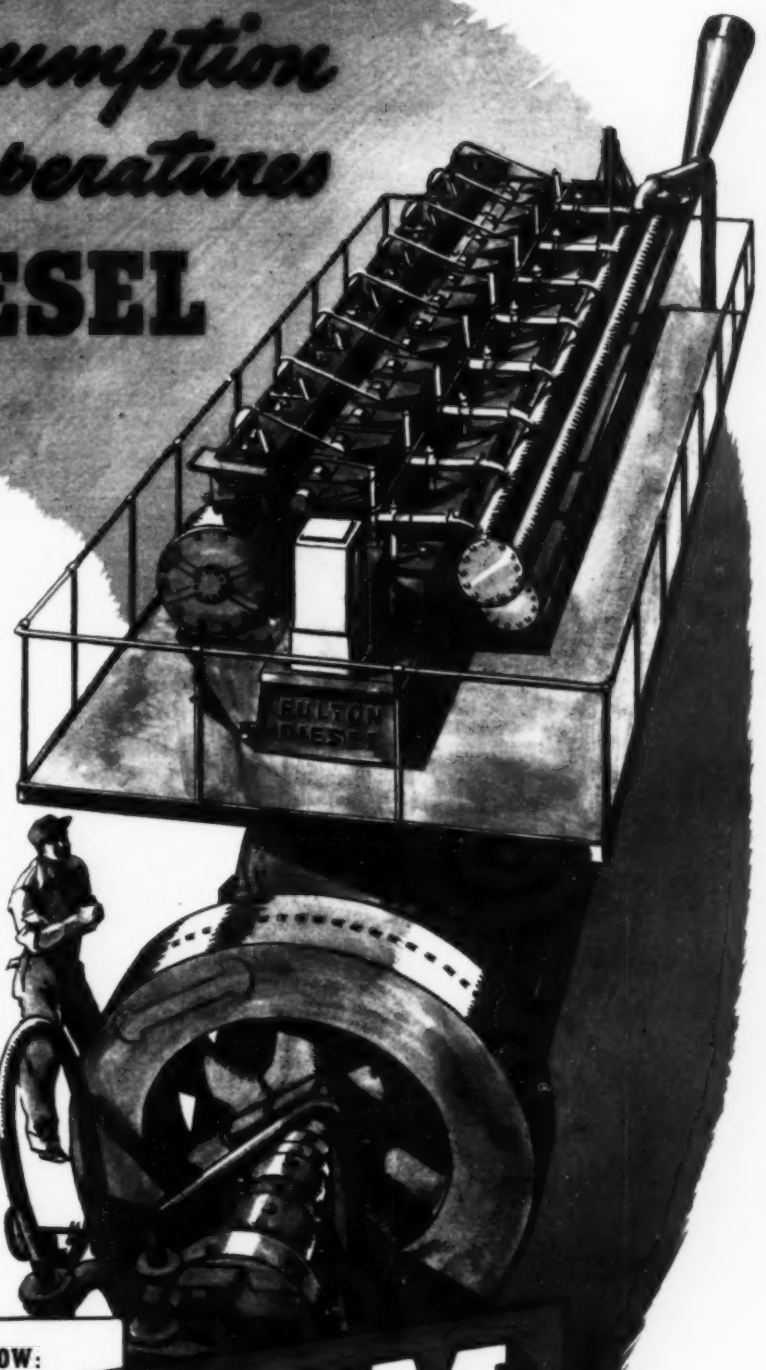
BETHLEHEM STEEL

NEW "RPM" DELO

[Diesel Engine Lubricating Oil]

Cuts Fuel Consumption and Exhaust Temperatures

IN FULTON DIESEL TEST



Let this thousand-horsepower engine drive home the story of one of the finest lubrication performance tests ever made in the Fulton Diesel Engine shops—

For the first 50 hours New "RPM" DELO was used to "run-in" the Fulton Diesel's brand-new pistons, rings and liners to a still smoother "mirror finish". Result—longer, full-power engine life from the start. Then the real performance test! Of course no rings were stuck—bearings were free from any sign of corrosion or wear—filters came through clean and unclogged.

BUT MORE! *Fuel consumption and exhaust temperatures were lower than ever recorded on any engine test in the Fulton shops!* Reduced operating costs! Higher engine efficiency!

Naturally, after its great performance test New "RPM" DELO is recommended for Fulton Diesel Engines. Try it in your own equipment, regardless of size, type or make. You'll profit by it!

New "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

ORDER FROM YOUR NEAREST DISTRIBUTOR AS LISTED BELOW:

IN THE UNITED STATES

"RPM" Diesel Engine Lubricating Oil:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol "RPM" Diesel Engine Lubricating Oil:
The Carter Oil Company, Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso "RPM" Diesel Engine Lubricating Oil:
Standard Oil Company (Inc. in Kentucky)

Signal "RPM" Diesel Engine Lubricating Oil:
Signal Oil Company

Sohio "RPM" Diesel Engine Lubricating Oil:
The Standard Oil Company (Ohio)

IN CANADA AND NEWFOUNDLAND

New Imperial "RPM" Diesel Engine Lubricating Oil:
Imperial Oil Limited

IN BRITISH COLUMBIA, ALBERTA AND SASKATCHEWAN

New "RPM" Diesel Engine Lubricating Oil:
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries. Get in touch with your nearest distributor—for a clean engine, and long service with minimum overhaul.

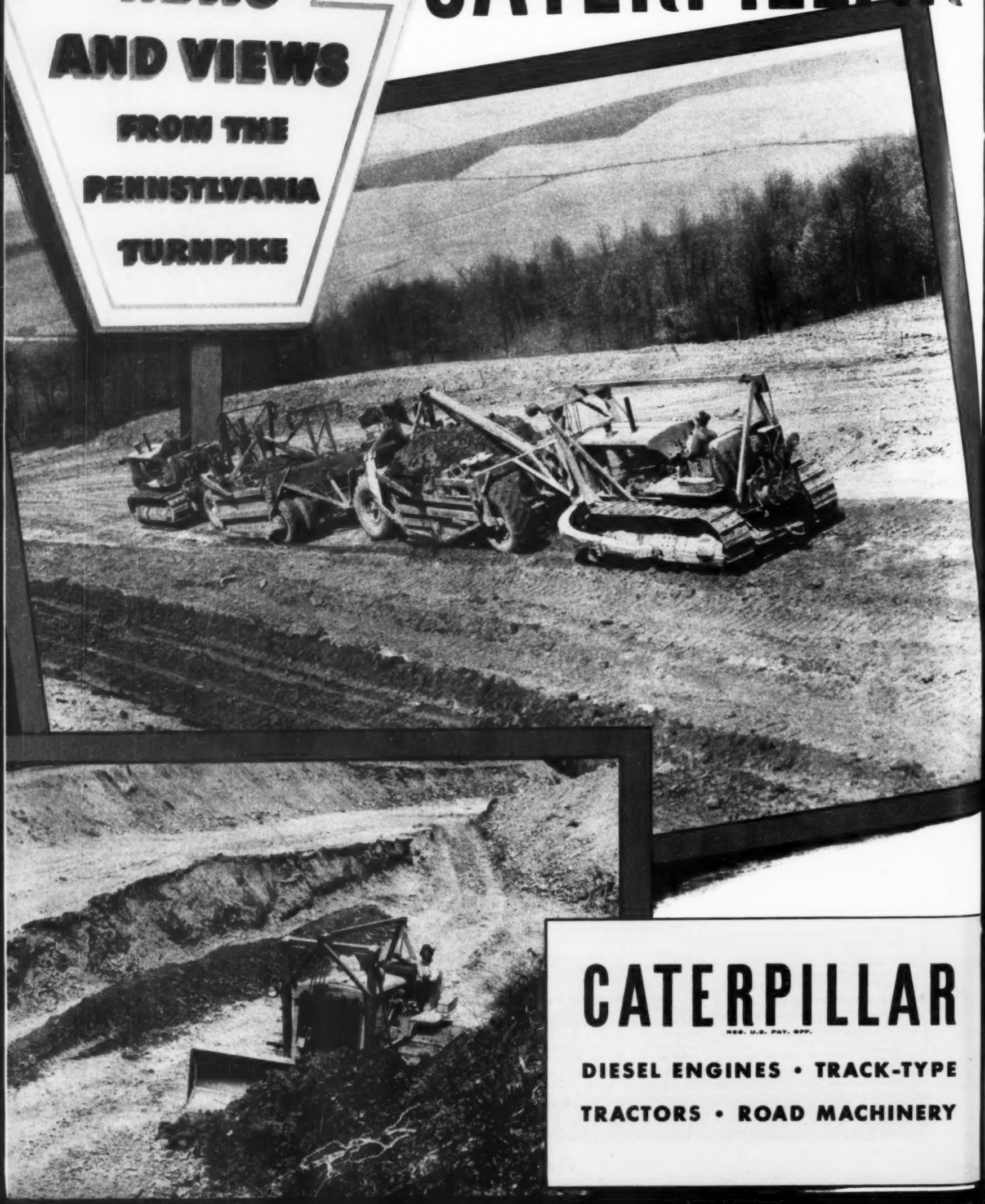
RPM
DIESEL ENGINE
LUBRICATING OIL

Unequaled
FOR EVERY DIESEL

STANDARD OIL COMPANY OF CALIFORNIA

"CATERPILLAR"

NEWS AND VIEWS FROM THE PENNSYLVANIA TURNPIKE



CATERPILLAR
REG. U.S. PAT. OFF.

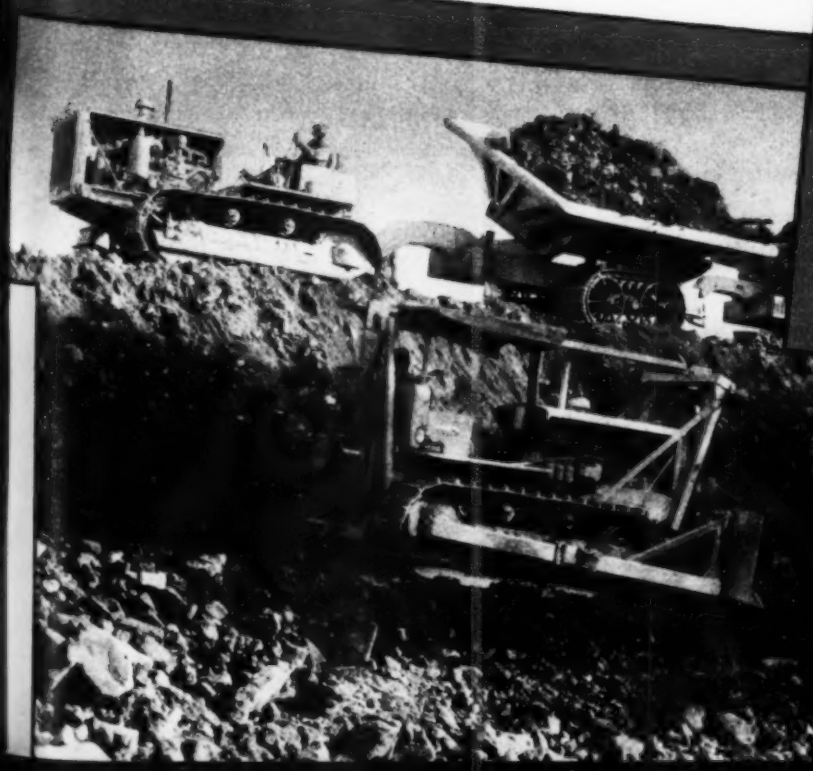
DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

DIESEL EQUIPMENT

Outnumbers All Others!

On August 16th, there was a total of 299 "Caterpillar" units at work on the Pennsylvania Turnpike. On this important operation . . . as on other big jobs everywhere . . . "Caterpillar" is the overwhelming choice. Here it outnumbers all other similar equipment combined, *five to one!* 230 "Caterpillar" track-type Tractors—and 206 of them "Caterpillar" Diesel! 42 "Caterpillar" Diesel Engines and 27 "Caterpillar" Road Machinery units complete the increasingly popular "Caterpillar" fleet on the one hundred and sixty-one miles of highway construction!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



"GULF helps us keep our equipment operating *without interruptions*" . . .

Says Superintendent on this big Pennsylvania Turnpike Job.

GULF

Moving 12 cubic yards of dirt per load, this large LeTourneau unit is kept operating continuously 16 hours a day with Gulf lubricants and fuel in service. The superintendent reports complete freedom from troublesome delays.

Elevating graders, tractors and trucks keep up with a fast working schedule on this job. The Gulf engineer cooperates with the mechanical men on the job to maintain proper lubrication and efficient operation.

"With GULFPRIDE OIL and GULF SOLAR FUEL OIL our Diesels are making a fine record"

"We have a large number of elevating graders, tractors, and trucks on this job," says this superintendent, "and we're keeping them all operating at peak efficiency. The Gulf engineer gave us the right recommendations for lubricants and fuel—and we follow them to the letter."

This big Pennsylvania Turnpike job represents one of the largest and most difficult road building jobs undertaken in recent years. The heavy work schedules call for efficient work from all equipment. That is why so many of the contractors on this job have standardized on Gulf quality lubricants and fuels. They find that the Gulf engineer gives them real service on the job, consulting with operating men and assisting them in maintaining the kind of lubrication which insures freedom from trouble and delays.

Make sure your equipment gets the benefits of Gulf's higher quality lubricants and fuels. They are available to you through more than 1100 Gulf warehouses in 30 states from Maine to Texas.

GULF OIL CORPORATION ★ GULF REFINING COMPANY
Gulf Building, Pittsburgh, Pa.

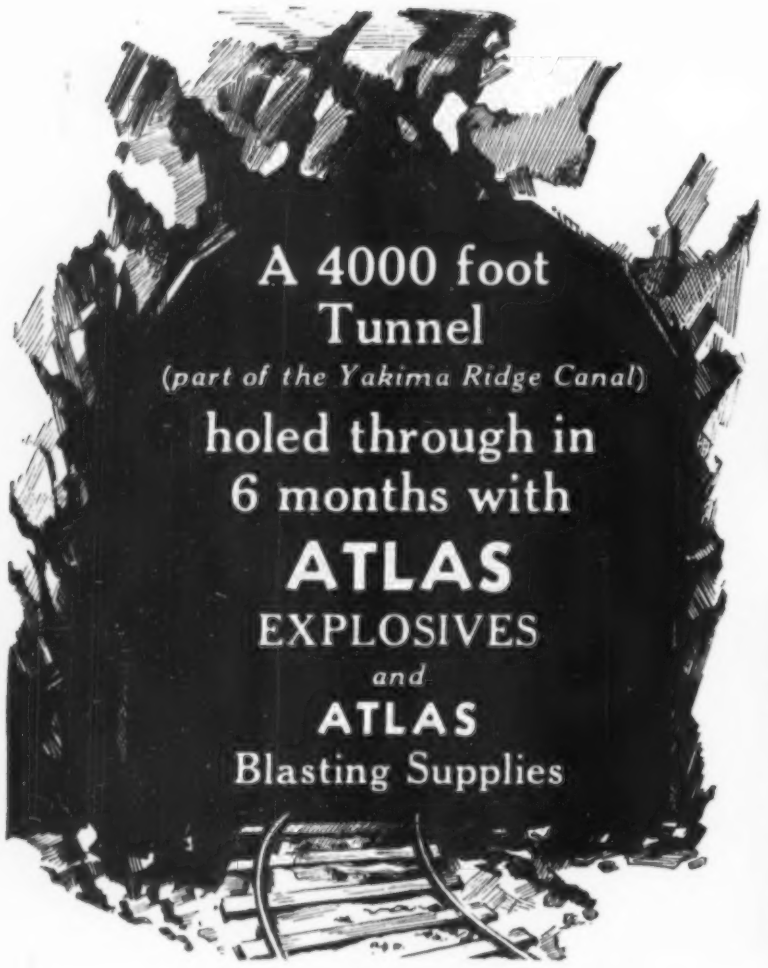
Guthrie-Marsch-Peterson Company of Chicago have two large excavating and grading jobs, and one tunnel job, on the new Pennsylvania Turnpike. This nationally known contractor is using Gulf quality lubricants and fuels for the various types of equipment in use on these big jobs.

new 604

A NEW SHOVEL BY KOEHRING . . . new design, modern construction with many features for lower operating and maintenance costs . . . increased yardage . . . more operating ease. Enclosed gears running in oil, anti-friction bearings, forced-feed lubrication, welded construction, less weight, greater strength, high speed are a few of the important reasons why the new Koehring 604 is a profitable investment. A new catalog, giving complete description of this new Koehring Shovel, illustrates the outstanding progress made in shovel design. Write for it today.

KOEHRING CO.
MILWAUKEE • WISCONSIN

HEAVY-DUTY CONSTRUCTION EQUIPMENT



Illustrations show work on the 600-foot approach to the tunnel.

A TUNNEL 19 feet in diameter—driven through 4000 feet of basalt and sandstone—at an average speed of 25 feet per day! That's going some on such a job!

T. E. Connolly, Inc. of San Francisco, Calif. and Moxee City, Wash., made this record on a section of the Yakima Ridge Canal, Roza Division, Yakima Washington Project—one of the largest irrigation jobs in the west. Work was started in July, 1938, by digging a 600-foot approach to the tunnel, as illustrated. The tunnel was holed through in January, 1939.

Atlas Giant explosives were used exclusively. They included Atlas Flo-dyn No. 4, Gelodyn No. 3, and 40% Special Gelatin —which produced effective results.

The Yakima Ridge Canal offers another example of how Atlas Explosives are contributing to better construction.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

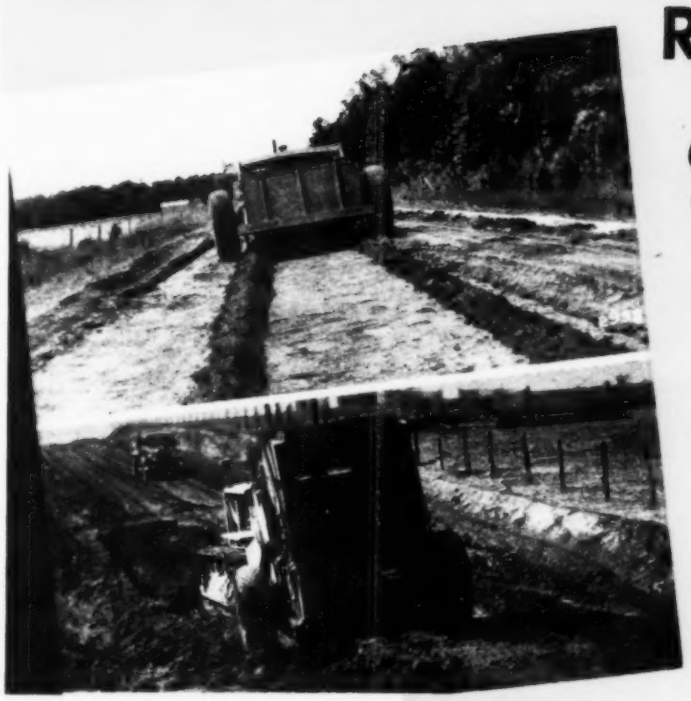
Allentown, Pa.	Houghton, Mich.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Joplin, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Chicago, Ill.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Denver, Colo.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

ATLAS
EXPLOSIVES

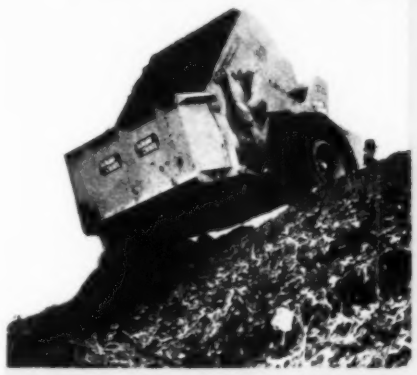
CHEMICALS ATLAS EXPLOSIVES

LAPLANT-CHOATE CARRIMOR

Rear Dumping Scrapers



Simplify Your Equipment
Step-Up Production
Guard Your Budget



(Top) LaPlant-Choate Carrimor digs and loads a full load with less power. The Carrimor digs and loads material that must be ripped for other scrapers.

(Center) Rear spreader gate automatically spreads material in a smooth layer. No power wasted in pulling scraper over the dumped load.

(Left) Rear dumping — an important time and money-saving feature. Finger tip hydraulic control of the entire scraper from one lever gives operator instant and complete command of all operations.

TAKE THIS EASY, dependable way to get your scraper operations on any job completed faster and at lower cost. Modernize with LaPlant-Choate hydraulically controlled Carrimors — the simple, rugged, versatile scrapers that more than pay their own way.

Digging, hauling, dumping, spreading — Carrimors do them all with greater speed and require less power. They save you time and money — increase your operator's efficiency and daily output — eliminate the need for "special equipment" to do work impossible for big scrapers.

Carrimors have the stability to work safely where other scrapers might tip over. They are scientifically designed to handle large pay loads of even the stickiest material on every bite. Every scraper job needs one or more Carrimors because they can be backed up and dumped over fills.

Built for use exclusively with "Caterpillar" Track-type Tractors. Available in 3 sizes. Get full details from your LaPlant-Choate and "Caterpillar" dealer. Write today for Free literature.

TAMPING ROLLERS
SCRAPERS • TRAILBUILDERS

LA PLANT-CHOATE MANUFACTURING CO. Inc.

RUBBER WHEELED WAGONS
BULLDOZERS • SNOW PLOWS

CEDAR RAPIDS, IOWA.

Right: Because of its light weight, one man can easily handle a 4x8' Plyform panel alone—even carry it over obstacles. The accepted standard thicknesses are 3/8" and 3/4". After serving many times as form material, Plyform panels can be salvaged for sheathing, subflooring and other utility uses.

Below: Further proof that Plyform gives smooth surfaces and numerous re-uses: Colburn Bldg., Wilshire Blvd., Los Angeles.

HERE'S WHY

PLYFORM

is ideal concrete form material!

1 Serves as sheathing and lining combined.

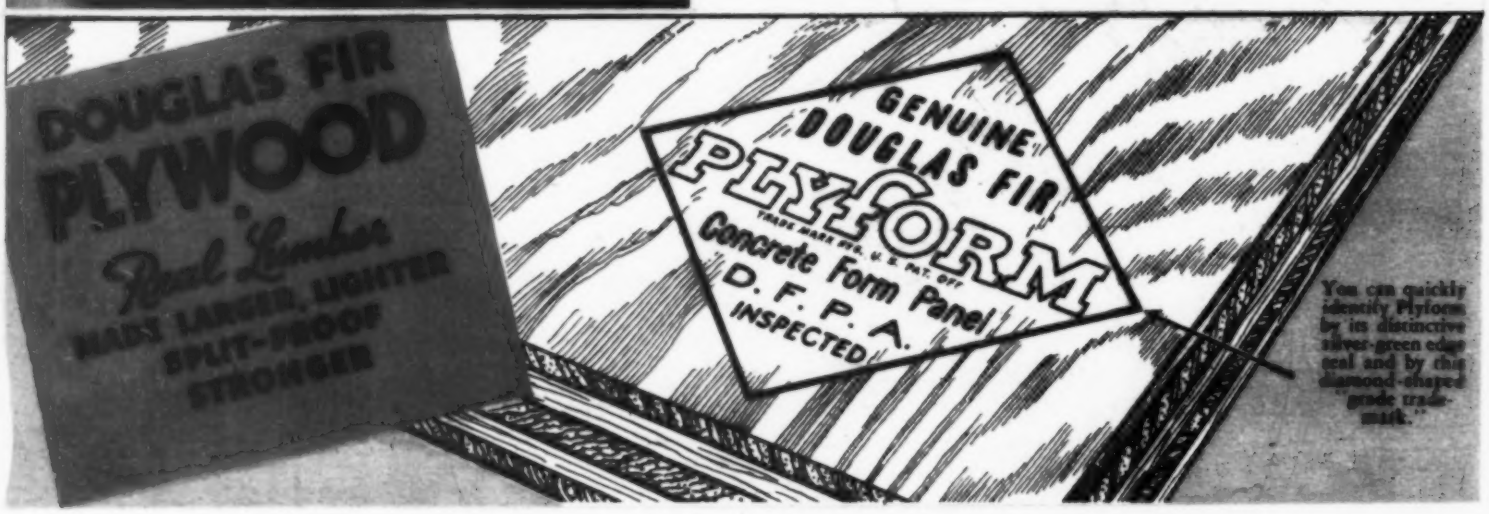
2 The satin-smooth surfaces of every Plyform panel are oil-treated at the mill.

3 Plyform panels are edge-sealed in distinctive silver-green; stamped with a diamond-shaped trade-mark for easy specification.

4 In Plyform only special premium water-resistant glues are used.

● More and more contractors are turning to Plyform every day! They have discovered that this concrete form grade of Douglas Fir Plywood produces smooth, flawless concrete surfaces *in addition to saving time, money, material and labor!*

Plyform panels give 100% coverage without waste . . . save up to 12c a square foot on rubbing and finishing costs alone . . . strip easily . . . and can be re-used numerous times when handled properly. For more information, see any recognized lumber dealer or write Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington, for Technical Booklet.



Modernize with

MARION

SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES

Write THE MARION STEAM SHOVEL COMPANY, MARION, OHIO, U. S. A. for Bulletins describing the size of Marion in which you are interested and a copy of the latest Groundhog.

These hoists on the spillways of the Seminoe Dam, Wyoming, were built by Foote Bros. Gear and Machine Corp., Chicago, with Nickel alloyed steels at all highly stressed points.

RE-ELECTED...

...good performance earns these steels another long term in a government job

ALLOY NICKEL STEELS

Studying past records of trouble-free performance, the U. S. Bureau of Reclamation specified high-strength Nickel alloy steels for three huge spillway gate hoists at the Seminoe Dam in Wyoming.

This important contract was awarded to the Foote Bros. Gear and Machine Corp., Chicago. Thanks to accurate metallurgical control, and the homogeneous structure induced by addition of Nickel, every alloy steel part tested higher than Government specifications.

The greater toughness and increased ductility of steels strengthened with Nickel is doubly helpful when heat treatment is necessary to develop maximum physical properties. For your particularly hard jobs, specify Nickel alloy steels or Nickel cast irons in all vital parts.

SPECIFICATIONS TELL WHY NICKEL STEELS LOWER UP-KEEP:

WORMS—SAE 2315 low carbon 3½% Nickel steel, case-hardened to a minimum of 70 Shore. Core properties exceeded.....	Tensile strength, p.s.i.....	80,000
	Yield point, p.s.i.....	55,000
	Elongation in 2", %.....	17
	Reduction in area, %.....	55
GEARS and SPROCKETS—Cast or forged from SAE 3130 Nickel-chromium steel, tested to exceed	Tensile strength, p.s.i.....	85,000
	Yield point, p.s.i.....	60,000
	Elongation in 2", %.....	20
	Reduction of area, %.....	45
SHAFTS—PINIONS—DRAG CHAINS—SAE 3140 Nickel steel. Minimum physical properties were specified as.....	Tensile strength, p.s.i.....	110,000
	Yield point, p.s.i.....	80,000
	Elongation in 2", %.....	18
	Reduction of area, %.....	50

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

TAKE A TIP FROM THE ARMY

FOR MODERN SPEED IN HAULING!

Today the U. S. army is *modern*—it is motorized AND mechanized. Governments have built thousands of miles of highways to facilitate the movement of *motorized* units to the scene of battle. They have spent millions of dollars to *mechanize* with tanks and armored cars for the actual fighting on the battlefields where no highways exist.

Take a tip from the army: Motorize with trucks where you have a pavement or its equivalent—a smooth road. Mechanize with ATHEY FORGED-TRAK TRAILERS where there is no highway . . . where you need to maintain consistent speed through mud, rock, sand, snow, and ice. For Athey Forged-Trak Trailers give you consistent, profitable hauling speed OFF THE PAVEMENT . . . where motor trucks would be helplessly mired . . . where rubber-tired wheels would slip on clay . . . spin on ice . . . dig deep ruts in mud or be damaged on rock.

Its profitable—to mechanize with Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel Tractors. Get the whole story from your "Caterpillar" dealer or write us direct:

ATHEY TRUSS WHEEL CO., 5631 W. 65th St., CHICAGO, Ill.
Cable Address: "TRUSSWHEEL" Chicago

FLASH!

Many of the Contractors working on the Pennsylvania Turnpike Highway have mechanized their jobs with Athey Forged-Trak Trailers and "Caterpillar" Diesel Tractors

MECHANIZE TO KEEP THE LOADER SWINGING

TO PREVENT— "Pile-ups" of hauling equipment stopped by mud, rock, sand, or slippery going.

TO PREVENT— "Partial Loads" in an effort to nurse Motorized Equipment "to work."

TO INSURE— Uninterrupted hauling cycles allowing maximum loader output.

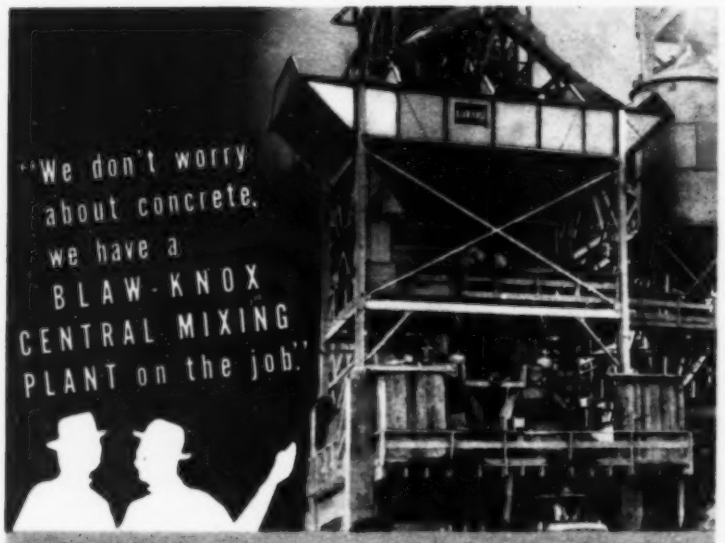
The broad, flat tracks of Athey Forged-Trak units stay on top of the mud—provide a roadway over rock—over snow and ice—over slippery clay. It's a firm roadway for your big, heavy loads—a "steel highway" that brings consistent speed regardless of bad going.

MECHANIZE WITH ATHEY FORGED-TRAK TRAILERS

As a matter of fact this feature is standard equipment and does not cost more. It is especially desirable where the bucket handles loose granular materials because it keeps lubrication in and dirt out. This and many other desirable features of Blaw-Knox Buckets is fully described and illustrated in Bulletin No. 1606. Write for it today.

17

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmer's Bank Bldg. Pittsburgh, Pa.
Digging and Rehandling **BUCKETS**



Engineering advice, based on sound experience, is offered as a part of Blaw-Knox service in the design and arrangement of a central mixing plant for your job.

Stationary or floating plants, manual or automatic in operation, have been furnished on hundreds of jobs. Many of them are illustrated in Blaw-Knox Catalog No. 1566.

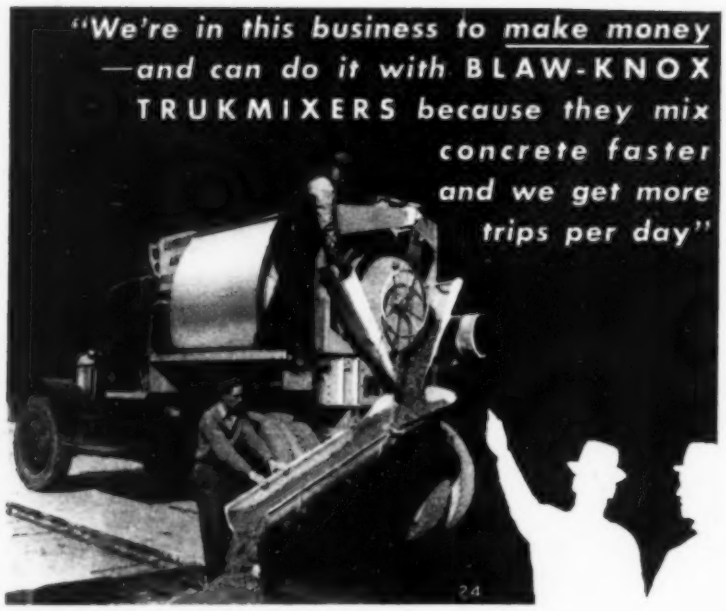
BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.
Offices and Representatives in Principal Cities

BLAW-KNOX
Central Mixing Plants

Blaw-Knox BULK CEMENT PLANTS are the ultimate in portability, speed, and convenience of use and operation. They are *complete units* for unloading, storage, batching and handling of bulk cement—dependable and accurate.

21 Completely described in Blaw-Knox Catalog No. 1566. Send for copy.

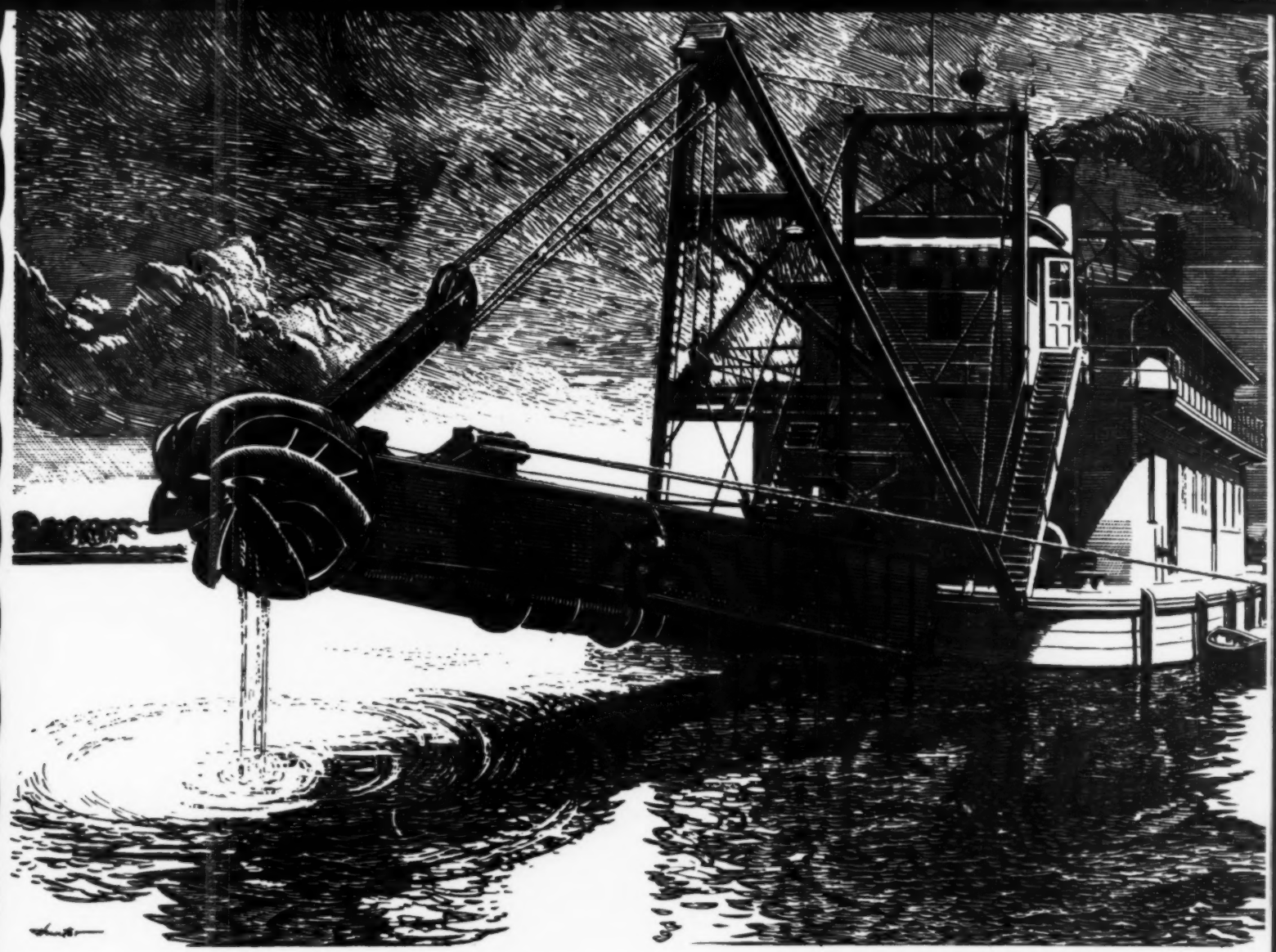
BLAW-KNOX BLAW-KNOX DIVISION
Bulk Cement Plants


"We're in this business to make money —and can do it with BLAW-KNOX TRUKMIXERS because they mix concrete faster and we get more trips per day"
24

It's a comfortable feeling to have truck mixers working for you that perform 100% under all conditions. No breakdowns—no worries.

You make a *profitable investment* when you buy Blaw-Knox Trukmixers and agitators. Write for Catalog No. 1582.

BLAW-KNOX BLAW-KNOX DIVISION
Agitators and **TRUKMIXERS**



J&L *Precisionbilt* WIRE ROPE HELPS YOU WIN YOUR FIGHT TO KEEP OPERATING COSTS LOW —

There's too much at stake to rely on a "weak-kneed" wire rope. There are too many hazards and too many chances for costs to shoot out of sight. J & L Precisionbilt Wire Ropes do a real job. They are made to fight corrosion — to stand-up under the pounding strains of heavy, surging loads and to hold their strength against mutilating abrasives encountered on the job.

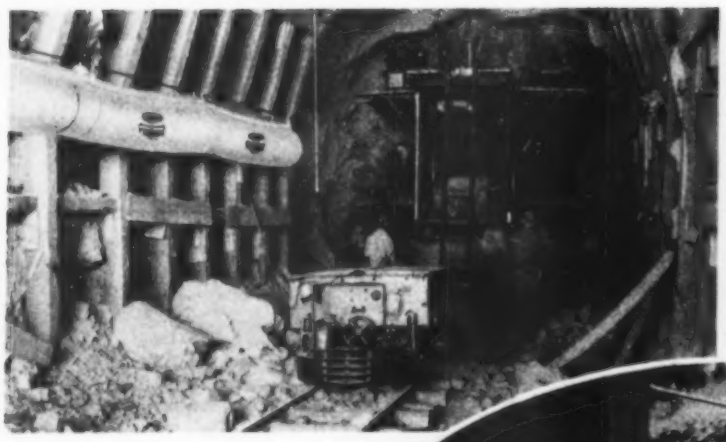
J & L Precisionbilt Wire Rope is made exclusively of J & L Controlled Quality **(CQ)** Steel and constructed to a tolerance of 1/1000 inch. When Precisionbilt Wire Rope is on the job, operations hum with increased speed, renewed dependability and greatest economy. Keep your running costs low and your work on schedule — specify J & L Precisionbilt Wire Rope.

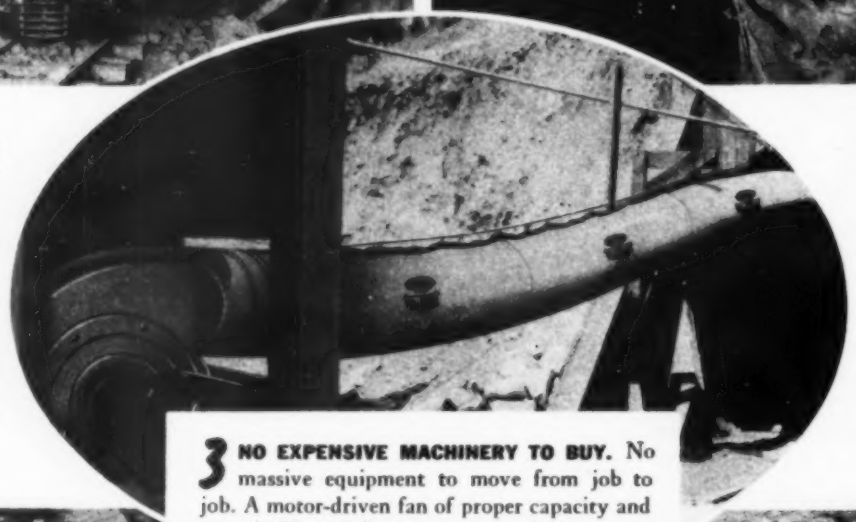
JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS
GILMORE WIRE ROPE DIVISION
PITTSBURGH, PENNSYLVANIA

J & L—PARTNER IN PROGRESS TO AMERICAN INDUSTRY

5 Reasons Why VENTUBE* is Used on so Many Big Jobs

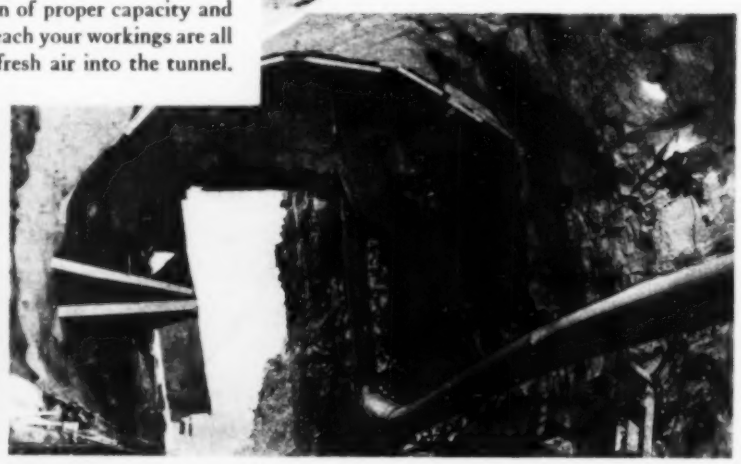




1 RIGHT AT THE HEADING where you need it most—that's where "Ventube" rubberized ventilating duct gets! And to protect the tubing from flying rocks while blasting, the sections nearest the heading slide back quickly and easily. After blasting "Ventube" slides forward again, bringing you clean, fresh air.

2 IT'S EASY TO HANDLE. "Ventube" is lightweight. One man can install the entire system in a few hours. New type suspension hooks speed up work. Sections secure in air-tight joints in a few seconds. When the job is finished, it's easy to lift the hooks off the wire, roll up "Ventube" and carry it to the next job.

3 NO EXPENSIVE MACHINERY TO BUY. No massive equipment to move from job to job. A motor-driven fan of proper capacity and enough "Ventube" to reach your workings are all that's needed to blow fresh air into the tunnel.



4 FLEXIBLE AS A HOSE. "Ventube" can go up and down steep inclines—turn sharp corners—go in and out of irregular passageways—and yet still keep a smooth interior for the unimpeded flow of fresh air. "Ventube" reduces air loss to a minimum. Sections are securely joined by air-tight detachable couplings to prevent leakage. You'll find "Ventube" is the cheapest, most effective way yet found to ventilate your tunnel.

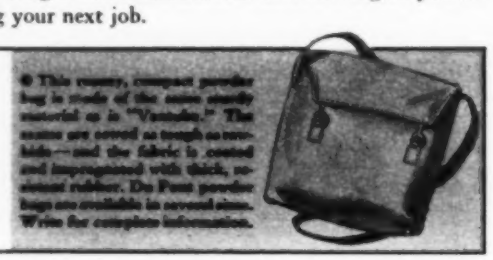
5 MADE BY DU PONT. "Ventube" is made of carefully selected cotton cloth woven to high du Pont standards. Even the thread that goes into the making of "Ventube" is chemically treated to resist fungus growth. Then the fabric is both coated and impregnated with rubber that makes it resistant to acid, gases, fungus and moisture! Ask du Pont to give you an estimate for ventilating your next job.

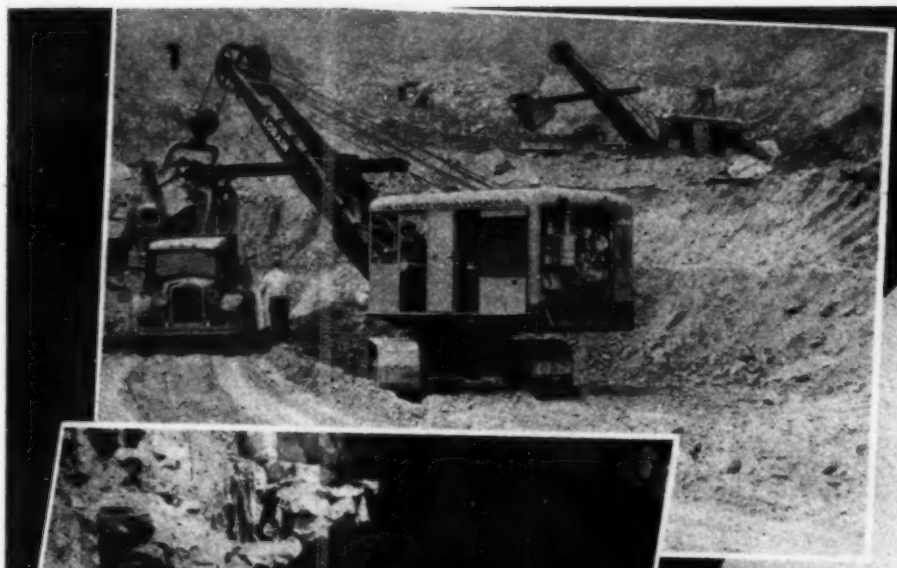
DU PONT VENTUBE

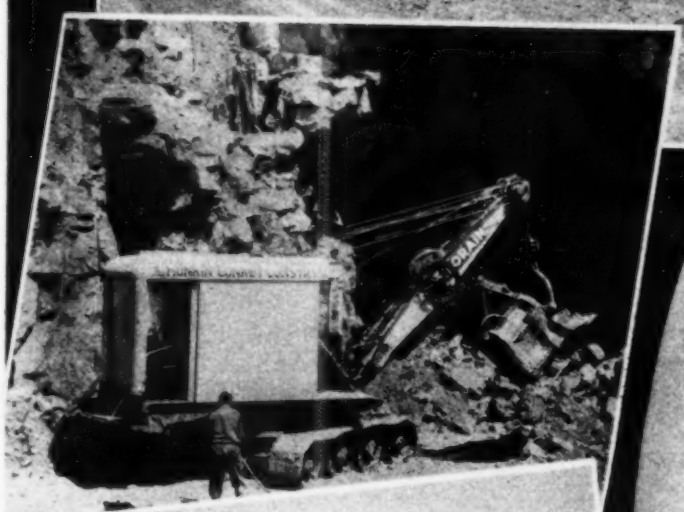
E. I. DU PONT DE NEMOURS & COMPANY (INC.)
"FABRIKOID" DIVISION · FAIRFIELD, CONN.

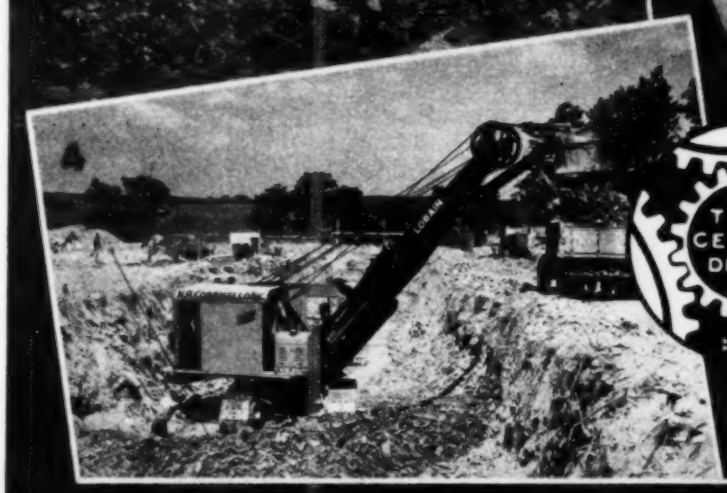
** "Ventube" is du Pont's registered trademark for its rubber impregnated flexible ventilating duct.*

THE FLEXIBLE VENTILATING DUCT









58 LORAINS

. . . ONE FOR EVERY 2½+ MILES OF THE PENNSYLVANIA TURNPIKE

● Here's the world's highest pressure job—22,000,000 yds. of rock and earth excavation let on the fastest working schedules ever set up for a project of this size. There's one make of shovel that stands out on this job both in numbers and performance. It's Lorains all the way along the 161-mile battlefront—58 of them, ranging from ¾- to 2-yd. capacity, at work on contracts totaling 15,000,000 yds. Their selection represents a cross-section of contractor experience from Denver to Boston and North Carolina to Ohio, and testifies to the greater power, speed and staying qualities of Center Drive design.

What these owners want are shovels that will give them the biggest possible profit spread between bid and cost price. They're getting it with Lorains—and so can you. Write for catalogs describing ⅜- to 2½-yd. Lorain shovels and cranes.

THE THEW SHOVEL CO. • LORAIN, OHIO

1 2-yd. L-87 (background) and 1½-yd. L-79 (foreground) of Hinman Bros., Denver, Colo., average 6000 yds. per 16-hr. day on 405,000 yds. of East Approach and portal of Laurel Hill Tunnel (Hunkin-Conkey Constr. Co., Gen'l Contr.)

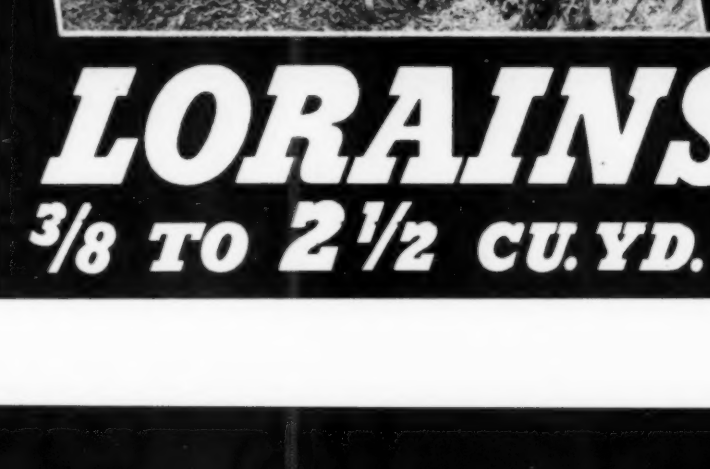
2 1¾-yd. Lorain tunnel shovel of the Hunkin-Conkey Constr. Co., Cleveland, O., opens West Approach to Laurel Hill Tunnel prior to entering the tunnel proper. (Photo courtesy of Electrified Industry.)

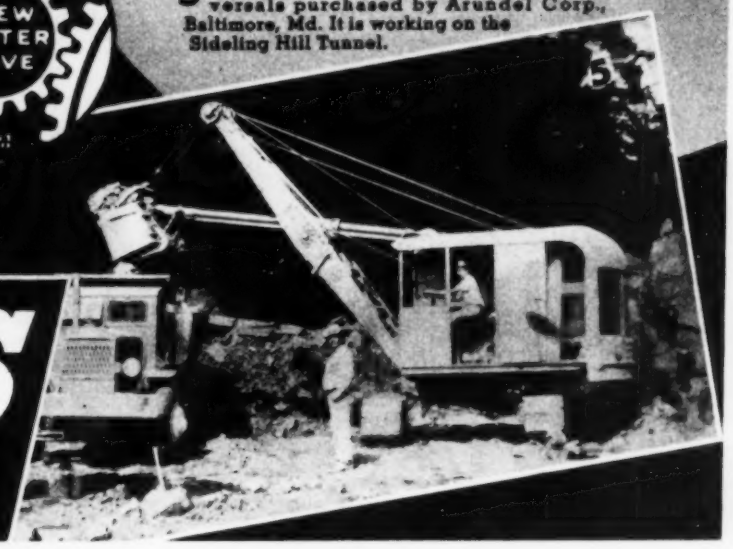
3 120 calendar days to complete 1,080,000 yds. of excavation! This 2-yd. L-87 of C. J. Langenfelder & Son, Rosedale, Md., is one of three Lorains this contractor has on two sections.

4 This 1¾-yd. Lorain-80 is one of 3 new Lorains purchased by N. R. Corbisello, Inc., Binghampton, N. Y., to handle a 1,115,000 yd. contract near Everett, Pa., which includes a 150 ft. cut, one of the deepest on the Turnpike.

5 This ¾-yd. Lorain-40 is one of 13 Lorains and Universals purchased by Arundel Corp., Baltimore, Md. It is working on the Sideling Hill Tunnel.

THEW CENTER DRIVE



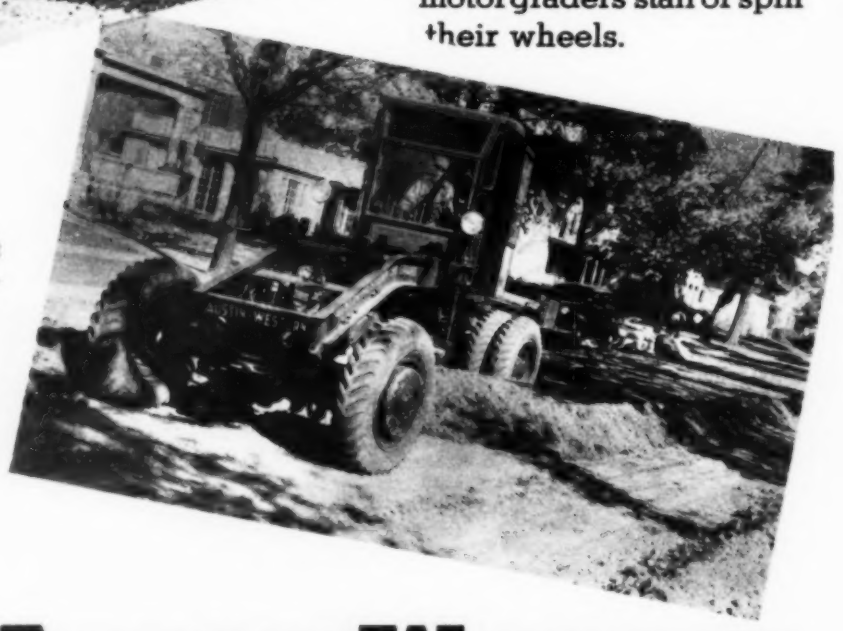


LORAINS
3/8 TO 2 1/2 CU. YD.

HERE'S THE "LOWDOWN" ON HOW A-W 99's FRONT END CONTROL . . .

Makes the "Impossible" Jobs Easy . . . Multiplies Motor Grader Usefulness ANYWHERE

● Two outstanding reasons for the "99's" amazing performance record on *"jobs too hot for a motor grader to handle"* are 4-Wheel Drive and 4-Wheel Steer. These distinctive features are responsible for its revolutionary front end control. Wheels no longer side slip. The blade stays where you want it . . . The entire weight of the machine is effectively used to secure traction . . . enables the "99" to wade through blow sand, loose gravel and other obstacles where rear drive motor graders stall or spin their wheels.



Above:
The weight of the heavily loaded blade cannot cause the front end of the "99" to slip or skid. The wheels avoid the loose material in the windrow assuring plenty of traction, plenty of speed.

● ● ●

At Right:
Notice how the operator avoids the windrow with his front wheels while moving a full load on the blade. Grading jobs like this one are easy to handle, and tolerances as close as a half inch are easy to secure because of complete control of every working part.

The AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

Motor Graders	Crushing and Screening Plants	Motor Sweepers	5-Yard Tractor-Scraper
Roll-A-Planes	Washing Plants	Shovels and Cranes	6-Yard Tractor-Scraper
Rollers	Blade Graders	Bituminous Distributors	8-Yard Tractor-Scraper
Snow Plows		Elevating Graders	12-Yard Hydraulic Scraper

THEY Specified CUMMINS DIESEL POWER

● More Cummins Dependable Diesels were built during the first eight months of 1939 than during any like period in the Company's 22-year history.

Cummins Diesels were specified by buyers of trucks, shovels, compressors, pumps, industrial locomotives and generators . . . men who knew *from experience* that the Cummins Diesel combines smooth running and economical diesel power with instant cold starting . . . protects these savings with low maintenance and utter dependability.

Road machinery manufacturers are glad to supply Cummins Diesel power. They know that when their machine is delivered to your job, they have no engine service problem, because your satisfaction is the Cummins dealer's major interest. A competent service staff and a complete stock of parts is always available. Cummins Engine Co., 2516 Wilson St., Columbus, Ind.

Bureau of Light and Power, City of Los Angeles, has been using this Cummins Diesel-powered Lima Paymaster ¾-yd. shovel to build roads through rocky California canyons. The Cummins Diesel uses only 15 gallons of fuel oil per 8-hour shift.

CONTRACTORS AVOID BREAKDOWNS AND DELAYS

Gasoline and oil economy is the first interest of a Standard Automotive Engineer. However, construction equipment operators particularly appreciate the freedom from motor failures, breakdowns and high maintenance that Standard Engineering Service brings them.

An Indiana contractor writes: "General savings in maintenance have been made at various times through the use of your Engineering Service in locating trouble which was corrected before it became serious."

A Michigan operator says: "Our equipment has been remarkably free from mechanical trouble . . . which we feel is largely due to the work done by your Engineer."

Let one of these Engineers demonstrate, on one of your own units, where economies can be made.

You'll find that any gasoline saving a Standard Automotive Engineer makes on your fleet is *not* made at the expense of maintenance and engine power. That's because they have portable testing equipment such as is shown above. They test the equipment *on the road* and in the shop. Their tests are bound to locate any weak spots.

RAISES TRUCK FLEET AVERAGE 2 MILES PER GALLON

Two miles more per gallon on an annual gasoline consumption of 20,000 gallons would mean 40,000 miles of fuel-free operation. In money, it would mean a saving of about 10% of the fleet gasoline bill. And that *is* the saving that a North Dakota truck operator made when a Standard Automotive Engineer finished checking his fleet.

Add to this saving the greater reliability of equipment on the road—ample power on the hills, fewer breakdowns—and the further advantage of consulting this Engineer whenever trouble does occur, and you have three good reasons for putting Standard Automotive Engineering Service to work for you. It costs nothing. The only requirement is that you operate in the 13 Midwestern states served by these Engineers. You can reach the Engineer in your territory through your local Standard Oil (Indiana) office, or by writing 910 South Michigan Avenue, Chicago, Illinois.

BUS FLEET SAVES 50% OF CHASSIS LUBRICANT

Increasing gasoline mileage from 3.95 to 4.97 miles per gallon is just one of many money-saving services rendered by a Standard Automotive Engineer for a large Central States bus company.

This Engineer also conducted a series of tests on motor oil to establish safe, economical drain practice. Again, by testing various lubricants and lubricating methods, the consumption of chassis lubricants was cut in half. This operator has one of the most modern maintenance departments in the country, yet Standard Automotive Engineering Service has proved helpful year after year.

ASK YOUR AUTOMOTIVE ENGINEER

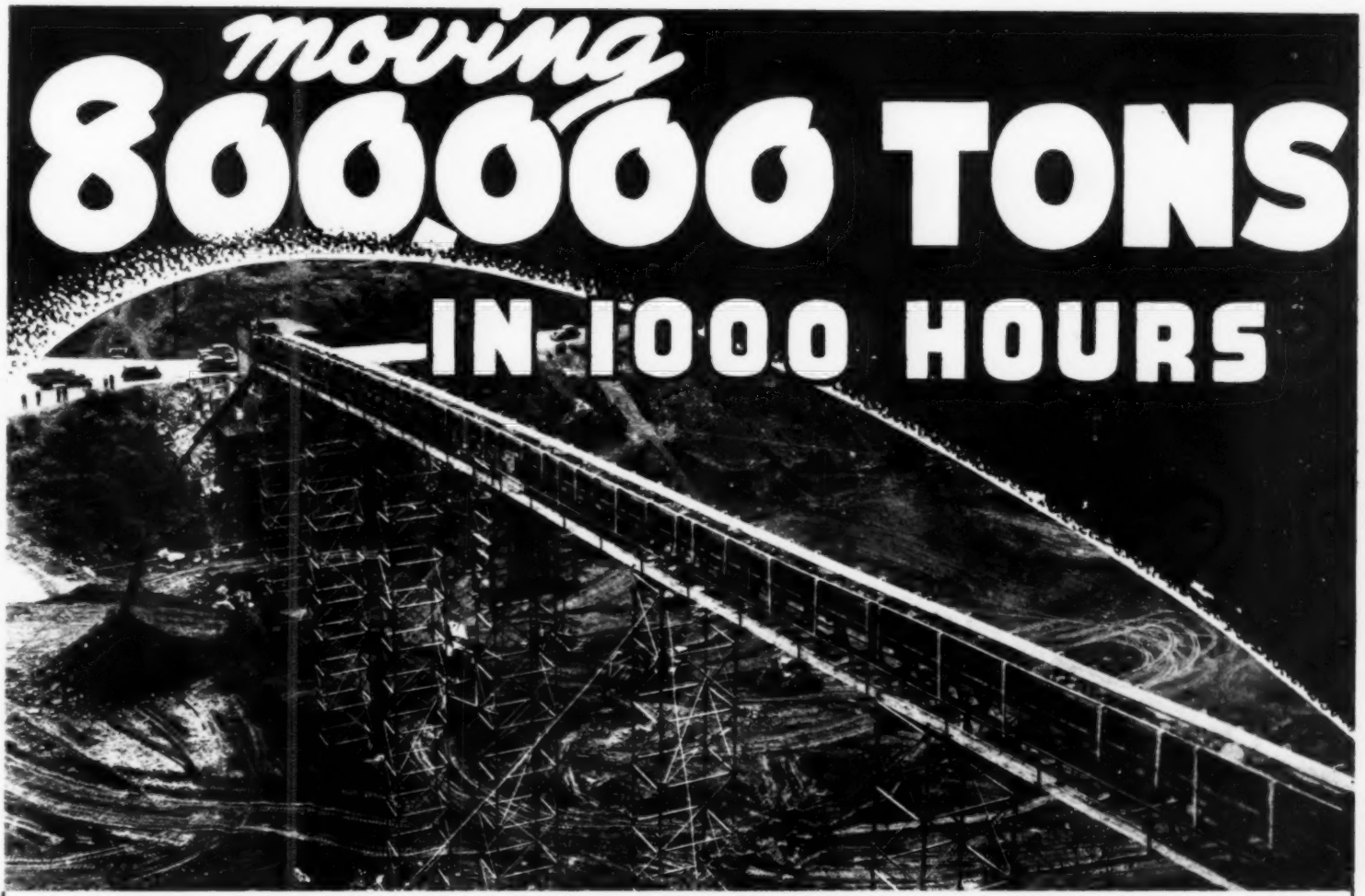
what he does and how he finds these economies in fleet operating costs. Call the nearest Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois.

FIRST IN SERVICE FOR FIFTY YEARS STANDARD OIL (IND.)

STANDARD OIL COMPANY (INDIANA)

AUTOMOTIVE ENGINEERING SERVICE

LOWERS MILEAGE COSTS



IN this interesting Pittsburgh job, the Harrison Construction Company is moving 800,000 tons with this Barber - Greene 42″ x 350′ Belt Conveyor at 800 tons per hour. The top of a hill is being removed for a housing project, and the excavated material conveyed out into a valley as a fill for a future playground. The excavated material, which includes stones as large as 20″ x 24″, is received by two Barber-Greene apron feeders which feed the B-G Conveyor. The Harrison Construction Company had many reasons for selecting Barber-Greene: quicker delivery; easier erection; drives and take-ups all factory assembled and aligned; and high versatility.

Barber-Greene's Standardized Sectional Construction will enable them to adapt their conveyor to practically any future job, and always insure a high resale value. Write for the Barber - Greene Conveyor Catalog. There is no obligation.

39-26

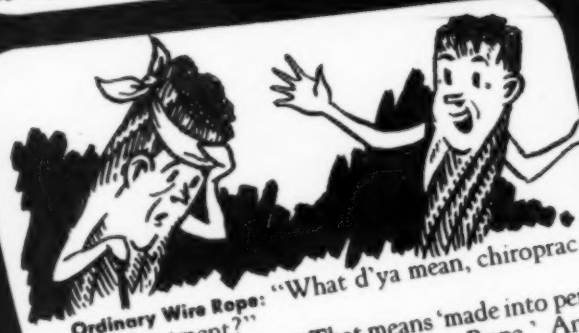
IF WIRE ROPE COULD ONLY *talk*...

Ordinary Wire Rope: "Don't you ever get tired?"
Macwhyte PREformed: "Naw. You see I come from a long line of famous strong back ropes, Macwhyte's the name. Being lubricated practically for life with a special lubricant, we Macwhytes have terrific resistance to internal friction and fatigue. Then, too, we're made of the finest steels."

Ordinary Wire Rope: "Oh-h-h, my back's about to break! I've been running in circles over sheaves and drums all day long. Oh-h-h . . ."
Macwhyte PREformed: "Buck up fella, you'll get over it. Where you working?"

Ordinary Wire Rope: "Gee, I'll bet you fellows live long, too."
Macwhyte PREformed: "Yes, we're pretty well known for our long life. You see at the factory before they let us go, we get a chiropractic adjustment and a thorough examination. Once they say OK to us, we're ready for a long life of heavy duty."

Ordinary Wire Rope: "On that shovel. Started this morning, and I'm all worn out. Say, you look like you never worked or worried. How do you do it?"
Macwhyte PREformed: "Me? Say, I work plenty, pal . . . been working on that job next to you for weeks. Night shifts, too. And I feel fine."



Ordinary Wire Rope: "What d'ya mean, chiropractic adjustment?"
Macwhyte PREformed: "That means 'made into perfect PREformed Macwhyte Wire Rope.' And believe me, brother, I earn money for the fellow who buys me...I'm built to take it."

MACWHYTE COMPANY, Kenosha, Wis. Manufacturers of wire rope and braided wire rope slings...New York...Chicago...Pittsburgh...Ft. Worth...Portland...Seattle...San Francisco...(Distributors throughout the U. S. A.)

NO. 431-A

MACWHYTE

Whyte Strand - PRE *formed* WIRE ROPE

BUCYRUS ERIE

Announces the new... 2½ yard.... 54-B

Big Machine STRENGTH Small Machine SPEEDS!

Diesel

SHOVEL-DRAGLINE-CRANE

The only machine of this size with conical hook swing rollers in double-flanged roller path . . . independent power - controlled boom hoist . . . swing clutches that are revolutionary in simplicity and smoothness of operation . . . special "swampcat" mountings for dragline service . . . quarry-type shovel front-end . . . fast, long-range dragline . . . ships on most U. S. railroads without major dismantling. Available also electrically driven — single motor or 3-motor with Ward Leonard Control. Write for full details on the new 2½-yard loader.

A matchless combination of power, strength, speed and operating ranges.

"Years Ahead" design combining features which have been thoroughly field developed and proven by unmatched performance of the 120-B and 10-B groups of Bucyrus-Eries. Outstanding, modern, destined to be imitated, the new 54-B is revolutionary in its ability to deliver big, low-cost output in the toughest digging. Find out now what 54-B performance can mean to your pocketbook.

Bucyrus · Erie

SOUTH MILWAUKEE, WISCONSIN

STATEMENT OF POLICY

The world is entering a crisis, the result of which no one can foresee. Other wars have brought inflation, followed by unemployment and depression after peace was achieved. America's experience in the World War illustrates this fact.

Much of this post-war trouble would have been eliminated by a more foresighted price policy on the part of manufacturers and distributors. Price inflation by the seller when he had a dominant position resulted inevitably in reaction with deflation, depression and suffering. Many of those price increases were not warranted.

Before such an inflationary cycle of prices is again started, we publicly pledge ourselves, as far as possible, to maintain present prices.

Further, if the materials we buy are increased in price, or the cost of labor is increased, then we pledge ourselves to raise selling prices no more than the bare increase in cost of raw materials and labor going into our products.

Further, we pledge ourselves to pass on to our customers the reduction in cost made possible by better manufacturing methods, wider distribution and technical advances in production.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio
October 2, 1939

J. F. Lincoln
President

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 21 | OCTOBER, 1939 | Number 10

War's Impact ON CONSTRUCTION

EVERY MAN WHO DEPENDS upon the construction industry for his livelihood has a direct concern in how the outbreak of war in Europe will affect him. Among the mass of conjecture and speculation generated by the present crisis, one thing appears certain: while the scene of hostilities is far removed, in actual mileage, from our shores and while the United States is not, for the present at least, among the combatant nations, war's impact will have a profound effect upon all American industry, of which construction is such an important element.

The course which construction activities will follow in the near future cannot be charted with any degree of accuracy because it will be governed largely by one of two contingencies—whether the United States maintains its present position of neutrality or whether, eventually, it will be drawn into the conflict as an ally with other warring nations. It is natural, at a time like this, to revert to the experiences of the period from 1914 to 1917, before this nation entered the World War, for guidance as to what the future holds. But there seems to be no justification for relying upon a more or less exact repetition of the course of events of those years. Then the war abroad broke suddenly. The world was unprepared for it. There had been a depression both here and abroad and Wall Street developed into a dumping ground for securities. It became necessary in July, 1914, to close the New York Stock Exchange. The present European war, however, has been regarded as a possibility, if not a probability, for a long time past. There was not the sudden shock of the 1914 declaration and, in this country, the start of hostilities abroad was the signal for a stock market boom. Industrial activity had been showing an improvement, with steel production reaching 71 per cent of capacity in mid-September.

DEMANDS ON CONSTRUCTION

War, on today's scale, means a vast consumption of goods by participants and a consequent expansion in demand for such goods from non-combatant nations able to produce them. On the assumption, therefore, that the United States will be able not only to manufacture but also to ship its products abroad, there should be a marked step-up in production by American industries. Price rises are in prospect, as well as a substantial increase in farm income.

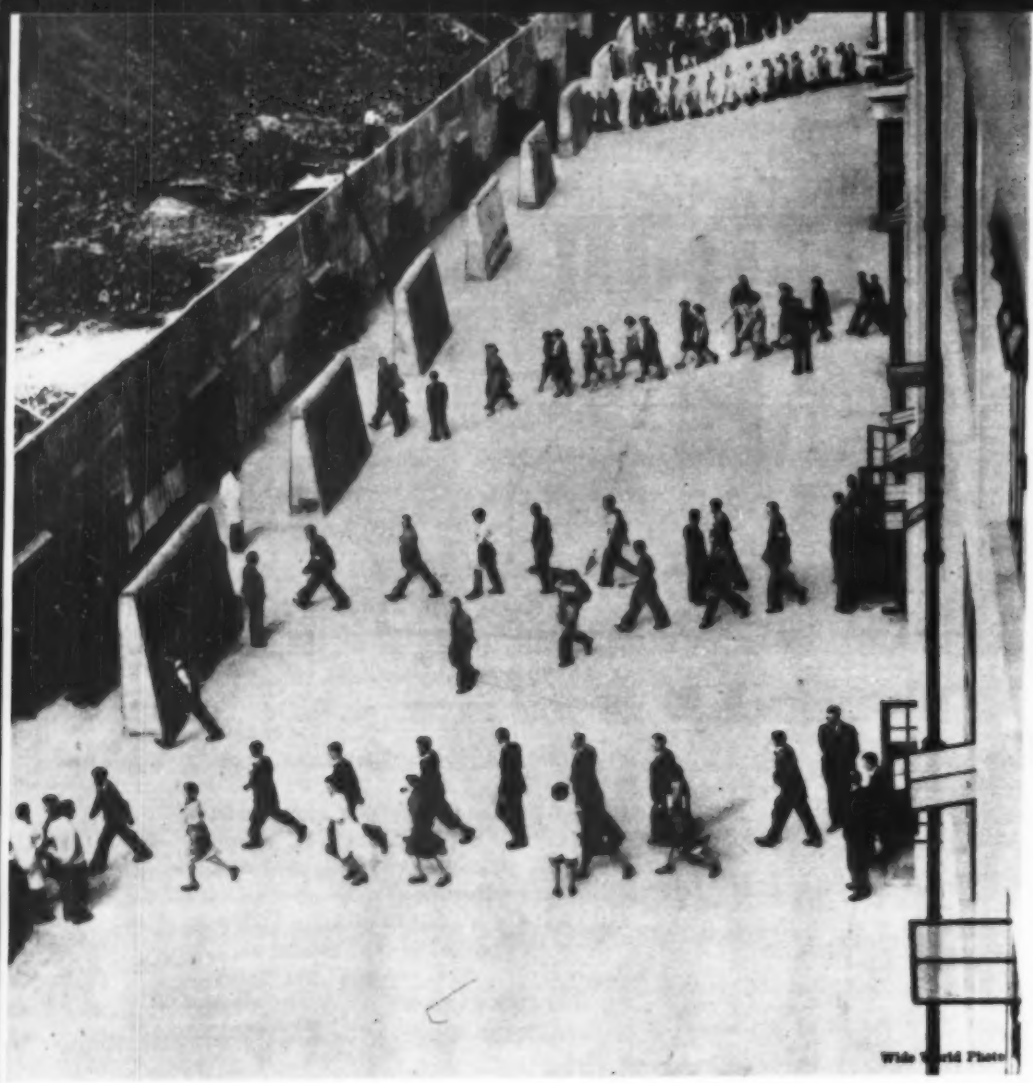
How will these new conditions arising out of war in Europe affect construction in the United States? With demands upon American industry for increased production covering a wide range of products, expansion of plant facilities seems certain. This increased demand will be translated into new factories, additions to present plants, modernization of existing structures and producing facilities and the scrapping of obsolete buildings and equipment. For the construction worker, therefore, it seems probable that industrial construction will open up a substantial volume of new jobs. This prospect seems all the more certain because, during recent depression years, industrial building construction has been at an abnormally low ebb. Deferred normal construction plus the wartime demands for new or enlarged plant facilities should start the industrial building curve on a steep upward climb.

Increased industrial production will demand a corresponding increase in

(Continued on page 96)

Acme Photo

NAZI TANKS carrying bridge building materials cross temporary bridge over river in Polish territory.



AIR-RAID SHELTERS, (left) with concrete baffle walls protecting entrances from splinters and other material scattered by exploding bombs, protect 6,000 employees of Standard Telephones & Cables, Ltd., at New Southgate, in Middlesex, England. Personnel is engaged in air-raid drill to insure rapid evacuation of main building in emergency.

AT LE BOURGET AIRPORT, (above) near Paris, where Lindbergh terminated his famous trans-Atlantic flight, underground air-raid refuge structure of reinforced concrete is being built alongside main building where passengers await planes.

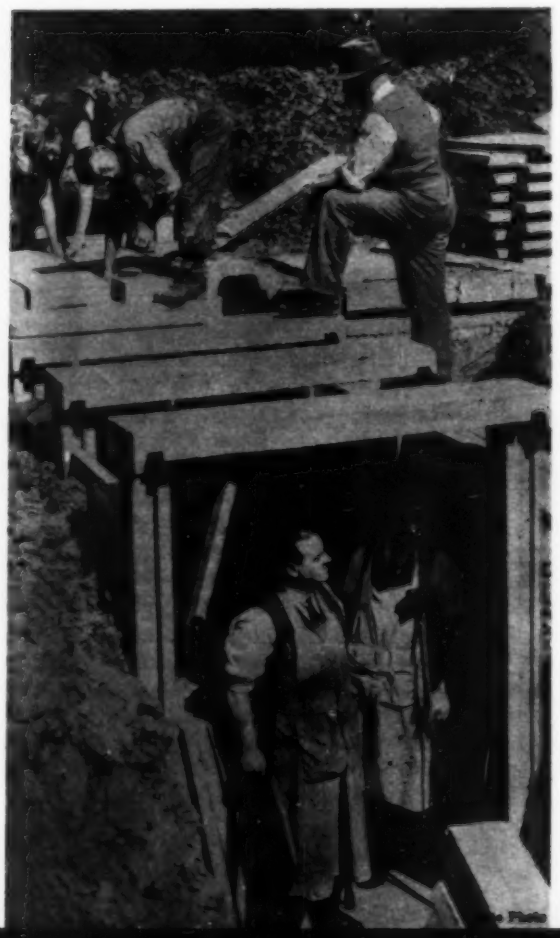
Construction methods and construction equipment are put to work on projects for defense of civilian population and protection of structures since declaration of war September 3.

ENGLAND AND FRANCE PREPARE FOR *Air Raid Bombing*

PRECAST CONCRETE "LUMBER" (below) is employed by disabled British ex-service men to build air-raid shelters at British Legion poppy factory in Richmond, Surrey. Ramps, instead of stairs, for entrances and exits are built to facilitate use by crippled men.

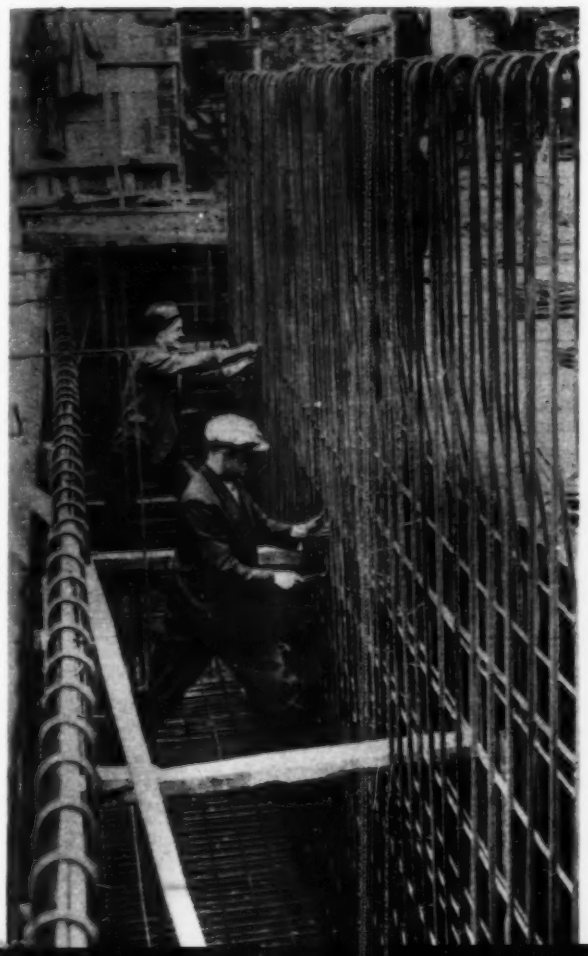
DURING "BLACKOUT" PERIODS, (left) vehicles and pedestrians are guided through London streets by checkerboard markings along curbs and white lines on pavements in event city is darkened for enemy air raid.

Wide World Photo



WITH AID OF POWER SHOVEL (right) rigged with skimmer scoop, Luxembourg Gardens of French Senate, in Paris, are being excavated to provide bomb-proof shelters.

CRAWLER - MOUNTED DRAGLINE digs in London's Kensington Gardens to provide earth for filling sand-bags for protection of city's buildings.

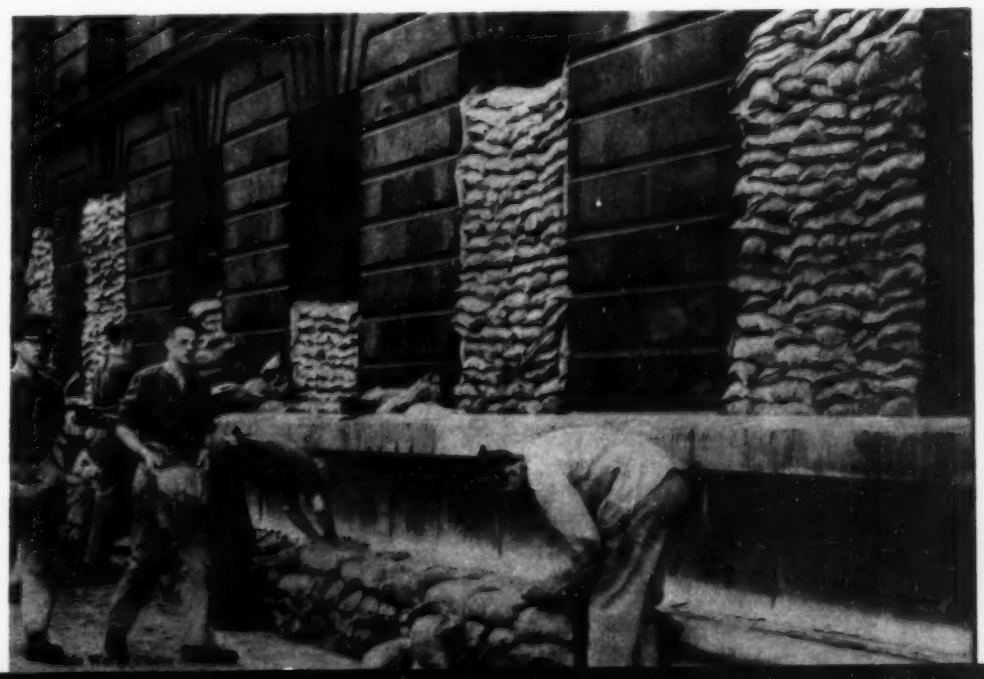


HEAVY CONSTRUCTION, (left) involving walls of reinforced concrete several feet thick, is feature of bomb-proof shelter at telephone exchange building in Croydon, Surrey, England.

Acme Photo

FILLING OF SAND-BAGS for barricading London buildings against effects of explosions is speeded up by use of portable steel hopper and vertical chute fed by hand shovels in vicinity of post office.

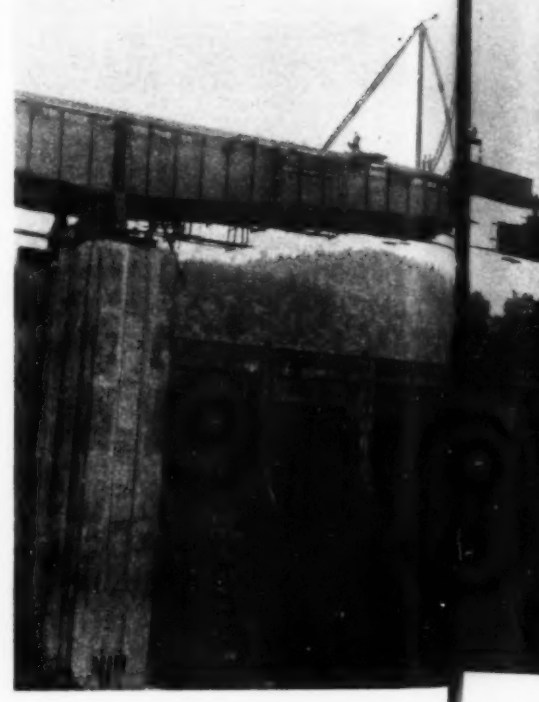
SAND-BAGS ARE PILED (below) along walls and in window openings of London's government buildings to protect them against bombing from air. Workers are here barricading War Office.

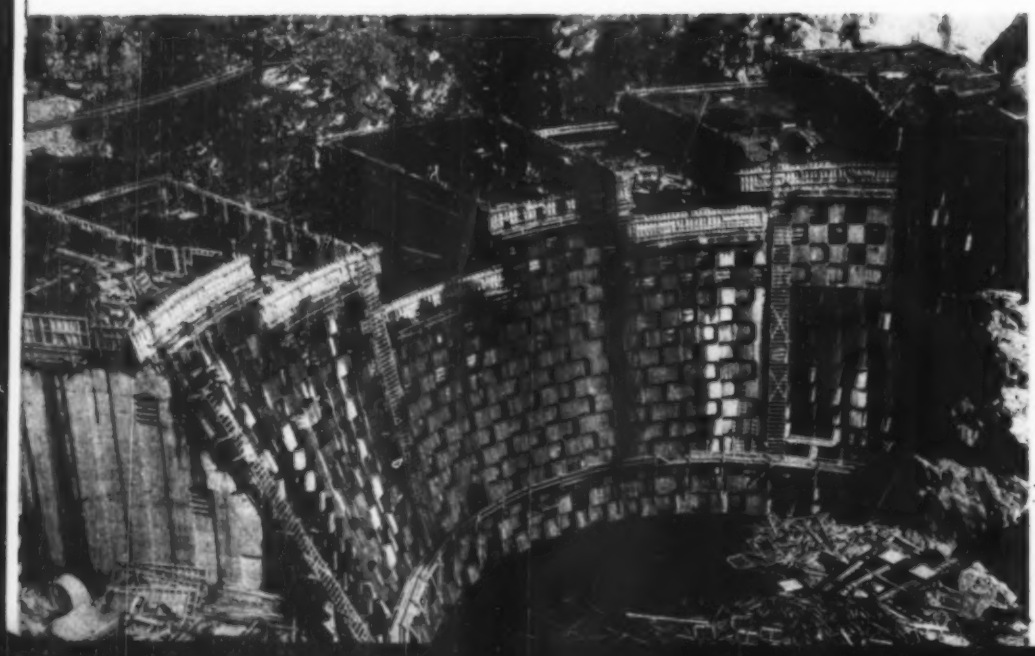


THIS MONTH'S NEWS REEL

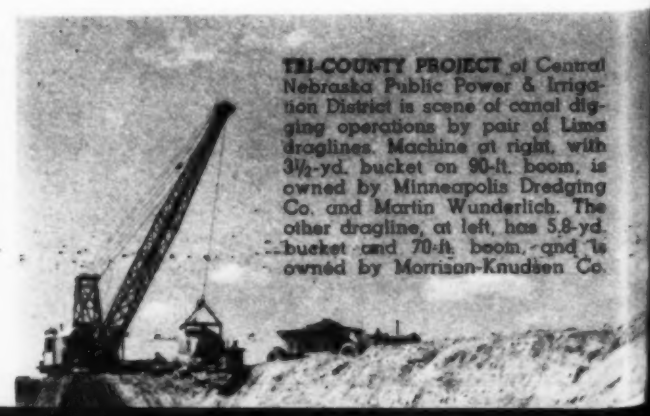
HIWASSEE DAM in southwestern North Carolina is sixth large dam for flood control navigation and power generation to be built by Tennessee Valley Authority. A straight gravity overflow concrete structure, dam will be 307½ ft. high, 1,292 ft. long on its crest and will contain 800,000 cu.yd. of concrete.

AMERICA'S HIGHEST HIGHWAY (left) is dedicated in colorful Colorado ceremony. Mount Evans route attains altitude of 14,260 ft. in Denver Mountain Parks, higher than road at Pike's Peak. Participating in ceremony are Miss Louise Simon, "Queen of the Highway," and Chief White Eagle of the Pueblo Tribe.

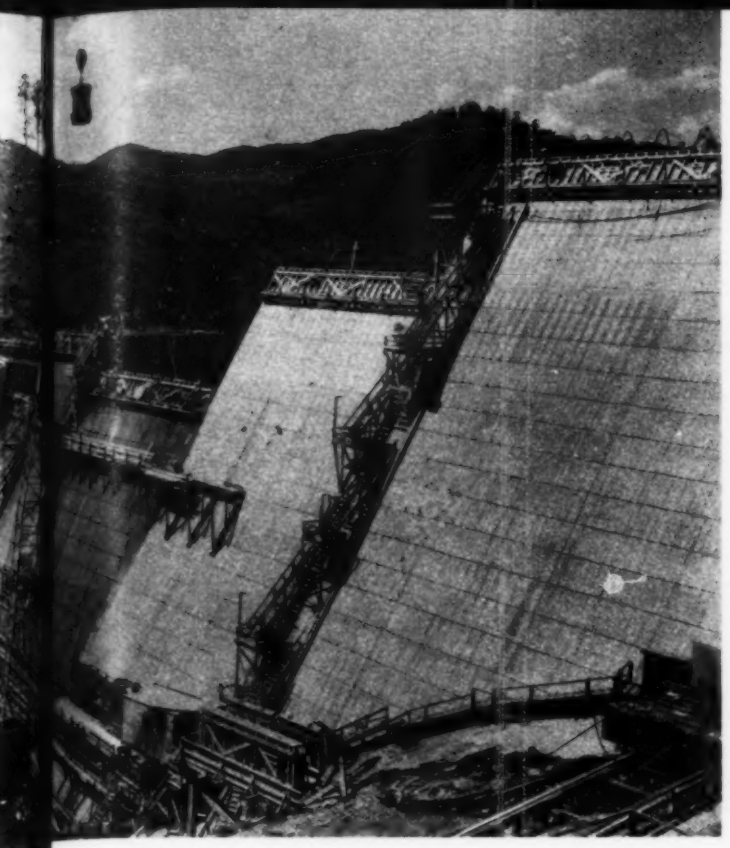


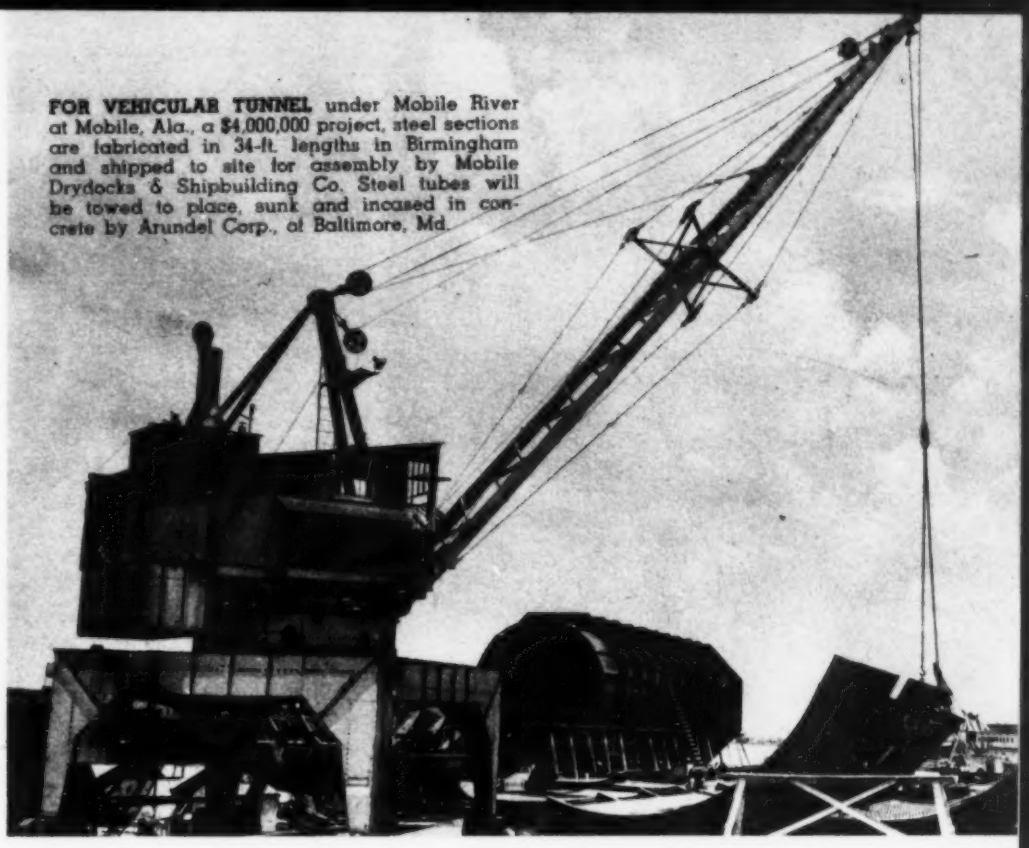


ROSS DAM (left) on Skagit River, Washington, attains part of its first stage height of about 225 ft., which may later be increased in two additional lifts to about 650 ft. by City Light Department of Seattle. Structure is of concrete arch design. Keys on downstream face of initial section are for bonding to wider and higher dam planned as future development. Present work is being done by General-Shea-Columbia Construction Co., under a $3,968,000 contract.



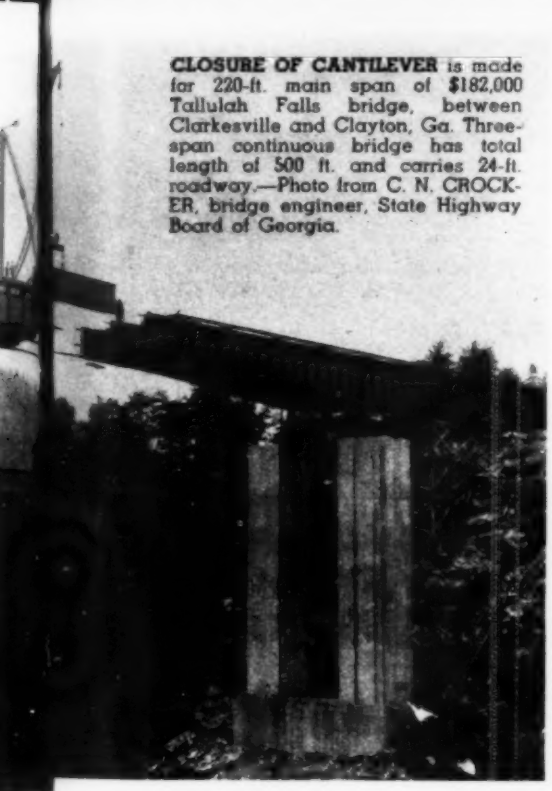
TRI-COUNTY PROJECT of Central Nebraska Public Power & Irrigation District is scene of canal digging operations by pair of Lima draglines. Machine at right, with 3½-yd. bucket on 90-ft. boom, is owned by Minneapolis Dredging Co. and Martin Wunderlich. The other dragline, at left, has 5.8-yd. bucket and 70-ft. boom, and is owned by Morrison-Knudsen Co.



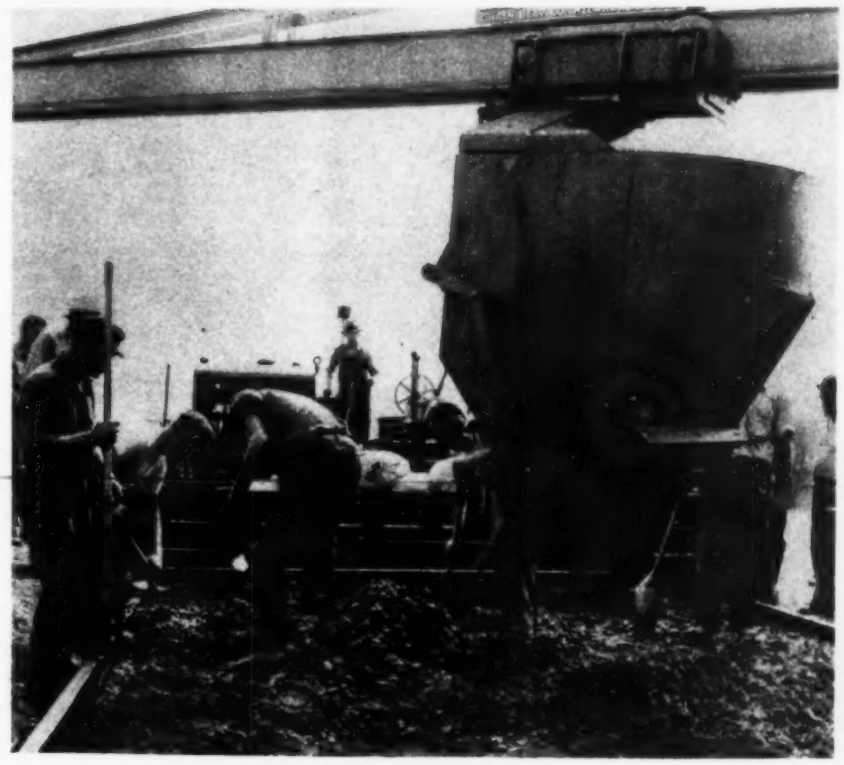


FOR VEHICULAR TUNNEL under Mobile River at Mobile, Ala., a $4,000,000 project, steel sections are fabricated in 34-ft. lengths in Birmingham and shipped to site for assembly by Mobile Drydocks & Shipbuilding Co. Steel tubes will be towed to place, sunk and incased in concrete by Arundel Corp., of Baltimore, Md.

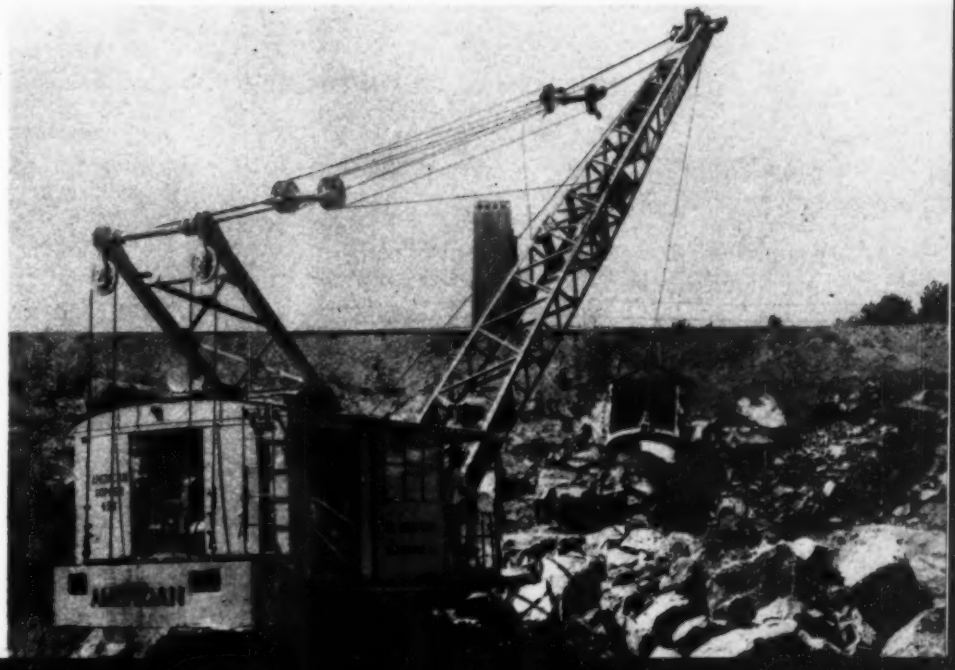
CLOSURE OF CANTILEVER is made for 220-ft. main span of $182,000 Tallulah Falls bridge, between Clarkesville and Clayton, Ga. Three-span continuous bridge has total length of 500 ft. and carries 24-ft. roadway.—Photo from C. N. CROCKER, bridge engineer, State Highway Board of Georgia.



PAVING OF PENNSYLVANIA TURNPIKE (right) between Harrisburg and Pittsburgh starts August 17 with placing of first concrete by 34E dual-drum mixer on $886,000 contract of Walker Bros., Chambersburg, Pa., involving 10.28 mi. of four-lane divided highway. Concrete is deposited in 12-ft. lanes of 9-in. uniform thickness, reinforced with bar mats. Total of 4,300,000 sq.yd. of pavement must be placed on 161 mi. of turnpike prior to specified completion date, June 29, 1940.



CHANNEL IMPROVEMENT (right) of Conemaugh River at Johnstown, Pa., scene of famous flood of 1889, is handled by 1½-yd. diesel-powered American Gopher dragline with 75-ft. boom and 2-yd. rock-bucket, operated by Al Johnson Construction Co. Feature of machine is a retractable mast which lies flat on roof of cab during shipment of machine on flat car and is raised to maximum height, as illustrated above, for operation on job.



BALANCED CUT AND FILL between Laurel Hill and Somerset, on Jacobson & McKinley subcontract for Connel & Laub Construction Co., of Dayton, Ohio, is handled by Cletracs hauling 12-cu.yd. Heil digging and carrying scrapers

HIGH SPEED GRADING JOBS MOVE 24,000,000 YARDS OF EARTH AND ROCK ON *Pennsylvania Turnpike*

THIRD DEEPEST CUT (below) on turnpike is at Mt. Joy, about 12 mi. from western terminus. Guthrie-Marsch-Peterson Co., Chicago, takes out this 100-ft. cut with two Northwest 2-yd. diesel shovels loading Euclid 12-yd. diesel rear-dump trucks. Shovel in foreground is about 20 ft. above grade. Wagon drills operated by 315-c.f.m. portable compressors sink blast holes in sandstone and shale.

SPEED SETS THE TEMPO of construction operations on the $61,000,000 Pennsylvania Turnpike between Harrisburg and Pittsburgh as the Turnpike Commission and its contractors enter the twelfth month of a schedule calculated to complete a three-year project in 20 months. Heavy concentrations of machinery and man-power are working night and day on grading sections and in seven tunnels to move 24,000,000 cu.yd. of earth and rock in time to permit placing of 4,300,000 sq.yd. of pavement on the 161 mi. of four-lane divided highway before the stipulated completion date of June 29, 1940. A recent five-day inspection trip over the open grading sections outside tunnels revealed scores of shovel and scraper outfits working three shifts a day to complete some 30 contracts in the short time limits specified. The accompanying pictorial survey high-spots a few noteworthy examples of typical grading operations. Subsequent illustrated articles will give additional information on grading, structures, tunnels and paving.

Even in five days it was not possible to visit all grading outfits at work on the turnpike. From actual observation during the course of the trip, however, it may be conservatively stated that contractors are operating more than 75

power shovels, 90 scrapers, 200 tractors, 250 rear-dump trucks, 30 bottom-dump pneumatic-tire trailers, 20 crawler wagons, 15 quick-dumping shuttle trucks and 6 crawler-traction trucks. At least 40 wagon drills were observed; to operate these units and numerous jackhammers requires about 100 portable compressors. When all supplemental equipment, such as 100 rollers and 30 or more auto graders, are taken into consideration, it can safely be estimated that the machines at work on grading contracts represent a value, purchased new, of at least $10,000,000.

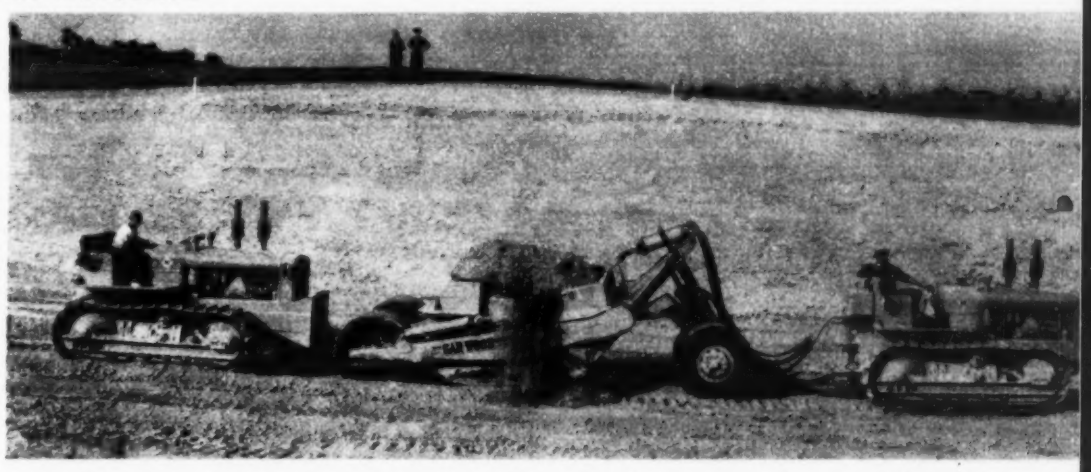
To operate this equipment, build structures and perform incidental jobs, the contractors require thousands of men. During August, with most contracts running three shifts and a few operating on a two-shift schedule, the total working force on the turnpike was 11,000 men, of whom almost 10,000 were contractors' employees. More than $34,500,000 worth of construction work was under contract at that time. As the project is financed by the PWA and RFC, workmen are limited to 40 hr. per week. A number of contracts operate six and seven 24-hr. days a week by having extra crews spell off the three regular shifts when the 40 hr. have been consumed.

Grading Contracts Average $500,000

Grading on the turnpike started Oct. 27, 1938, as noted in CONSTRUCTION *Methods and Equipment* (Feb. 1939, p. 58) in an article which described the location of the low-gradient express toll highway, designed to eliminate the hazards of the mountain barrier between East and Middle West. Several additional grading contracts were awarded during the winter, but the great bulk of the grading work was placed under contract during the spring and early summer, the final section being awarded Aug. 1, 1939, just two weeks before the first paving contractor started laying slab on a stretch of completed grade. Contracts for grading, drainage and structures, with a few exceptions, range between $200,000 and $900,000, striking an average of about $500,000. Two grading jobs run to something more than $1,500,000. Contract time limits vary from 90 to 250 calendar days on grading jobs now under construction. Later contracts in general have shorter time limits. More time is given for contracts involving deep rock cuts.

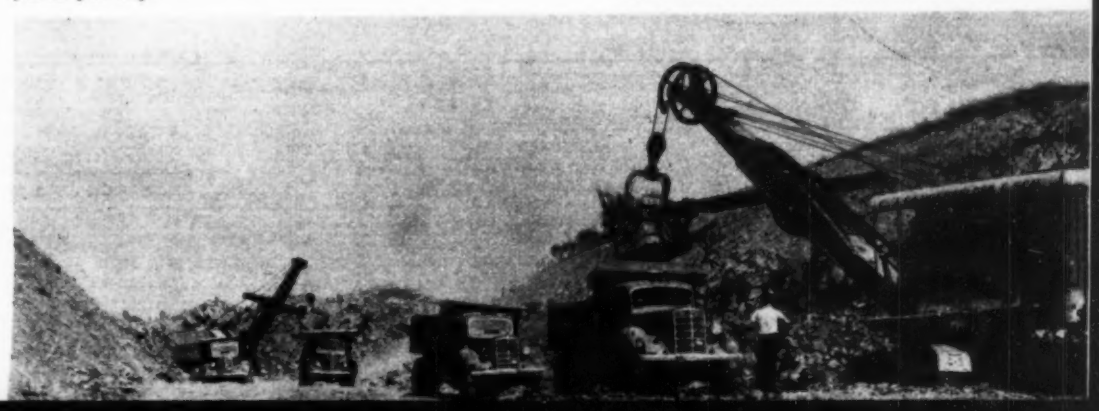
Figures on yardages moved by individual equipment units, as given with the accompanying photographs, are representative of machine performance on the turnpike. By the end of July, grading contractors had moved more than 8,000,000 cu.yd. of earth and rock. One of the largest monthly earth-moving records up to that date was for 344,000 yd. moved by the Connell & Laub Construction Co., of Dayton, Ohio, in May. Other contractors were geared to move comparable yardages.

FAST, EASY LOADING and rapid round-trip haul are claimed for Heil 12-yd. hydraulic scrapers and Cletrac 95-hp. diesel tractors by grading foreman on L. M. Hutchison's contract. Digging shale and hauling about 700 ft. one way, each of three units on job averages nearly 10 trips an hour and carries 7.6-yd. payload.



TWO-CYCLE DIESEL-FUEL ENGINES in these Allis-Chalmers 101-hp. tractors make a steady hum as they load Gar Wood scrapers with 10 pay yards (14 yd. loose) in average distance of 150 ft. for Herman Holmes, Crystal Falls, Mich. Special Allis-Chalmers pusher tractor works in conjunction with three tractor-scraper units averaging ten loads an hour, traveling 7 m.p.h. in sixth gear on 1,000-ft. haul to dump.

LARGEST SCRAPER FLEET (above) on turnpike consists of Cletrac 95-hp. tractors and Heil 12-yd. hydraulic scrapers. Jacobson & McKinley, Pittsburgh, after completing subcontract section for Connell & Laub, of Dayton, Ohio, near Somerset, assemble sixteen scraper units in first cut on portion of Herman Holmes contract at Mann's Choice preparatory to splitting up fleet into smaller outfits to handle separate grading sections. Breaking ground in this cut, eleven units working simultaneously average seven trips per hour per unit on 800-ft. one-way haul, carrying about 7 pay yards per trip.



FOR LONG HAUL of 3,300 ft. from two shovels in rock cut on contract section east of Sideling Hill tunnel, C. J. Langenfelder & Son use Mack trucks. As grading on this section is better than 95 per cent complete, working day has been reduced to two 8-hr. shifts, in which Lorain 1½-yd. gasoline shovel and Marion 1½-yd. diesel, in background, each load about 1,000 yd. of blasted rock.

Pennsylvania

WORKING TOWARD ALLEGHENY MT. TUNNEL from east, Marion 2½-yd. diesel shovel extends sidehill cut up one slope of hollow, loading spoil into Euclid 12-yd. diesel rear-dump truck on contract section of Central Pennsylvania Quarry Stripping and Construction Co., Hazleton, Pa. In addition to excavating equipment furnished by subcontractors, this contractor operates ten power shovels served by Euclid hauling units, both rear-dump and bottom-dump.

MULTI-DUTY UNIT built around Caterpillar 95-hp. diesel tractor serves many purposes in grading operations at Ft. Littleton interchange on contract section of Dalton Bros., Inc., Paoli, Pa. When not using bulldozer blade to push 12-yd. scrapers while loading, tractor sets teeth of Le Tourneau rooter to rip up shale.

FROM HIGH ELEVATION at which shovel is working, J. M. Phillips' International trucks haul down grade exceeding 45 per cent in places to build long fill stretching out at foot of slope.

FOUR-WHEEL REAR DRIVE on Ford truck enables unit to take 8-yd. heaped load excavated by Lima 2-yd. diesel shovel on Nello L. Teer's section, west of Everett. Contractor operates four Ford-Thornton four-wheel rear-drive trucks equipped with St. Paul 6-yd. water-level bodies.

EXCAVATION FOR ARCH CULVERT (left) on west slope of Clear Ridge, near Everett, is loaded into Linn crawler-traction truck by Lorain shovel. N. B. Corbissello, Binghamton, N. Y., constructs drainage structures in preparation for placing fill material from Clear Ridge cut, measuring 135 ft. on center lines, deepest cut on turnpike. This cut, replacing tunnel originally proposed for Clear Ridge, will require excavation of 1,115,000 cu.yd., mostly rock.

ELEVATING GRADERS are used by Guthrie-Marsch-Peterson Co. to make cuts in earth. Self-powered Caterpillar elevating grader drawn by 95-hp. diesel tractor cuts soil with 32-in. disk and spills it into 12-yd. water-level trailer wagons with 48-in. belt driven by 30-hp. gasoline engine. Euclid bottom-dump tractor-trailer units, powered by Cummins 135-hp. diesel engines, are loaded in rapid sequence. Under average good working conditions on this contract, grader is said to complete about 325 loads, or almost 4,000 yd., in 8 hr. Second Caterpillar elevating grader on job has 48-in. belt driven by power takeoff from tractor.

Turnpike (continued)

FAST DUMPING AND REVERSING by Koehring 4-yd. dumptors speeds earth-moving on section being built by Herman Holmes, Crystal Falls, Mich. Traveling 18 to 30 m.p.h., these units make fast time on ½-mi. haul from 1¾-yd. diesel shovel excavating sand-clay-gravel soil. Loose steel-pan bottoms hung by chains inside dumptors assure quick, clean dumping.

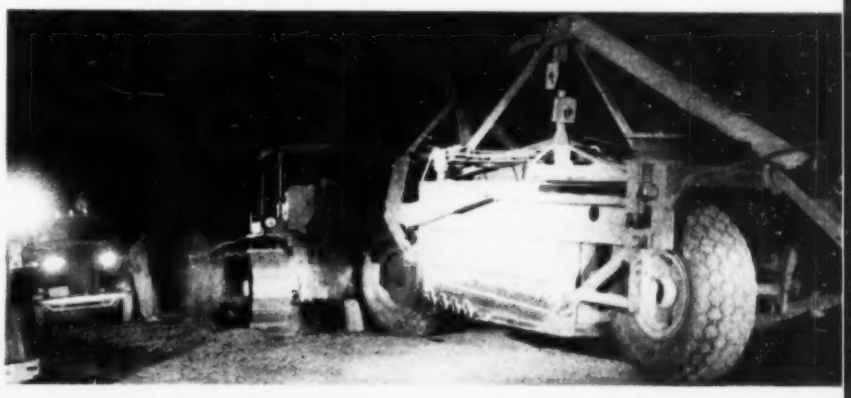
HIGH-SILICA ROCK encountered in portions of this cut on contract of L. M. Hutchison, Mt. Union, Pa., west of Tuscarora tunnel, proves hard on drill bits, some holes getting as little as 4 in. per bit. Ingersoll-Rand wagon drill served by Ingersoll-Rand 315-c.f.m. gasoline-powered compressor puts down row of 18-ft. vertical holes 5 ft. back from face. Horizontal 6-ft. holes also are drilled into bottom of rock face.

DUAL-TANDEM-WHEEL TRAILER of Austin-Western pneumatic-tired diesel-powered tractor-wagon unit hauls spoil for Conte-Eastwood, Inc., from shovel cut on contract section of Ferguson & Edmondson Co. and drops load quickly by bottom-dumping on fill. Three of these units are operating from shovel.

MAKING SIDEHILL CUT on heavy grading section which climbs eastern slope of Allegheny Mt. to tunnel portal, J. M. Phillips, Muncy, Pa., loads International 5-yd. truck with Lorain 1½-yd. diesel shovel on contract of Central Pennsylvania Quarry Stripping & Construction Co.

320-C.F.M. PORTABLE COMPRESSORS are popular size for operating wagon drills. Nello L. Teer, Durham, N. C., moves four of five new Gardner-Denver diesel units into sidehill cut in fractured rock along mountain slope above Raystown Branch of Juniata River west of Everett.

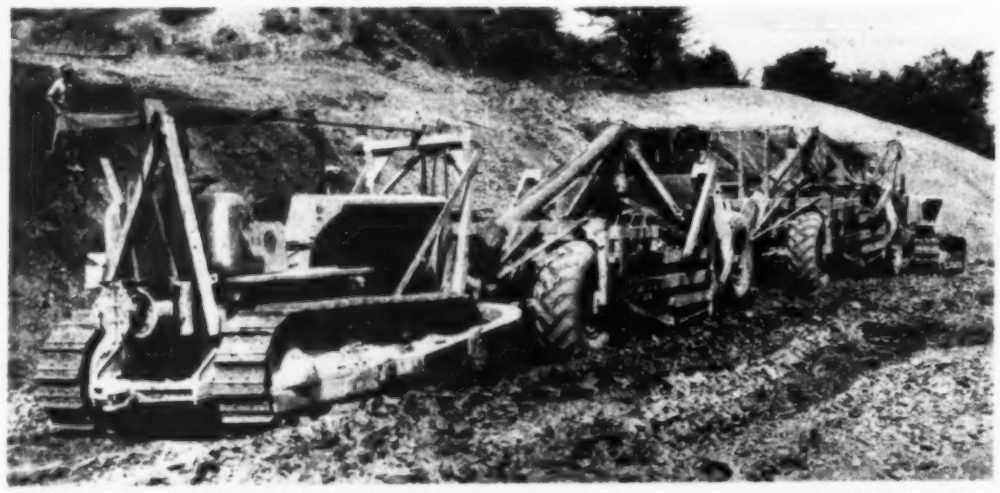
DRILLING 18 FT. TO GRADE (right) in shale rock cut on contract section of Empire Construction Co., Baltimore, Md., battery of five Ingersoll-Rand wagon outfits supplied with air from five portable 315-c.f.m. diesel compressors (four Ingersoll-Rand and one Worthington) sinks 1,200 blast holes at rates averaging 50 ft. per hour.



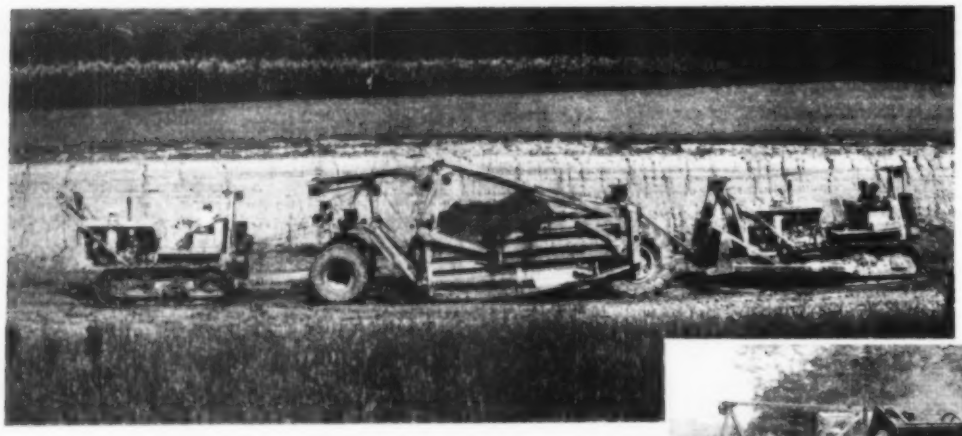
ALL THROUGH THE NIGHT floodlights burn on contract sections of Pennsylvania Turnpike as contractors push operations to complete work in short time limits specified. Portable generating plants, usually mounted on skids which sometimes carry floodlighting towers, furnish power for lighting on all grading sections except few which are near power lines. On fill of Dalton Bros. contract, illuminated by string of floodlights, 95-hp. diesel tractor and 12-yd. scraper pull up beside service truck for refueling and lubrication, during night shift.

Pennsylvania Turnpike (continued)

FOR ROCK WORK in cut of Empire Construction Co., Baltimore, Md., contractor operates Athey 14-yd. track wagons in tandem behind Caterpillar 95-hp. diesel tractors. Where grades are steep, one wagon is used with 70-hp. diesel tractor. Koehring 1¾-yd. diesel shovel loads 3,000 yd. of blasted shale per 21-hr. day in this cut.



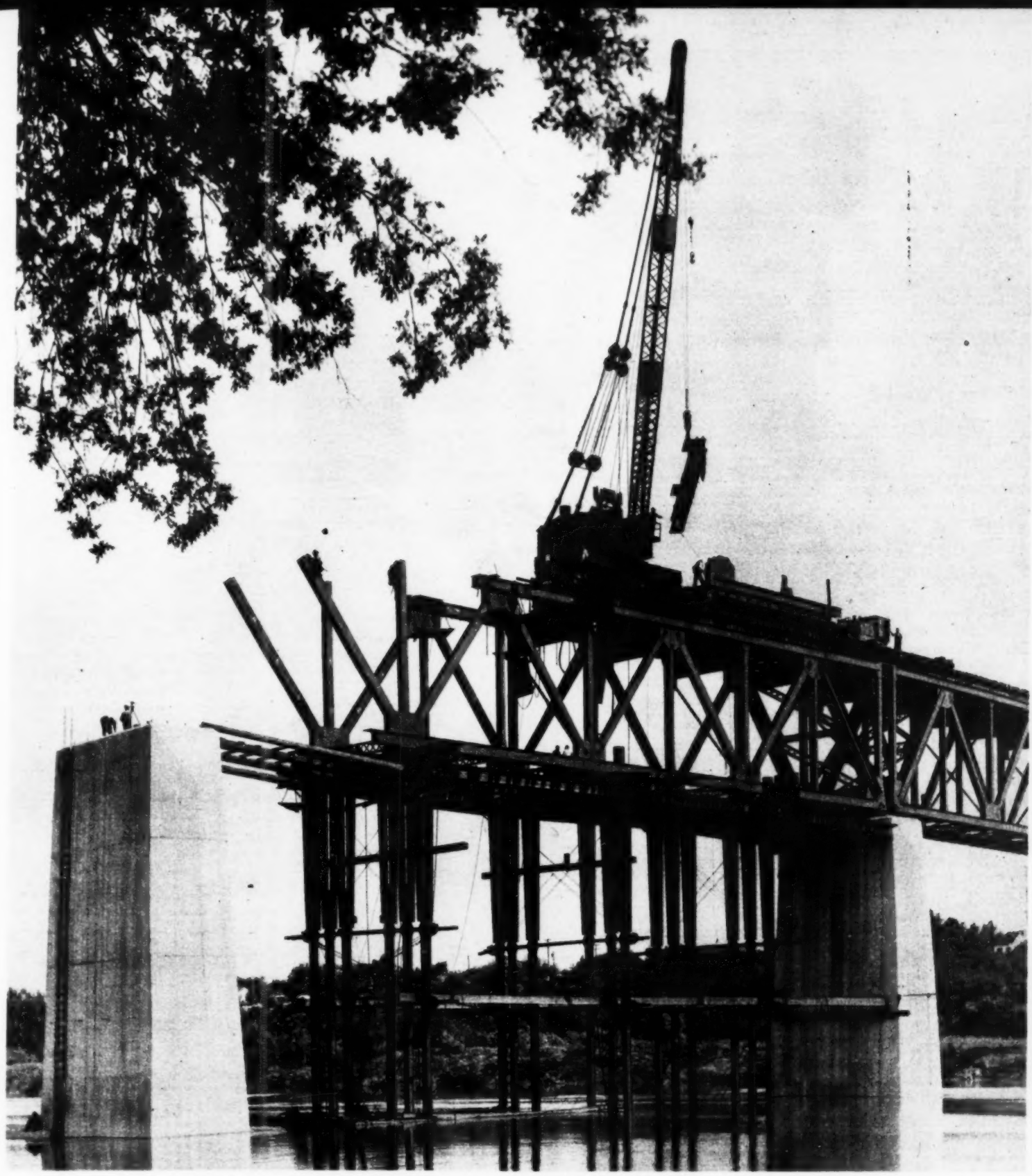
TANDEM SCRAPERS (right) of 15- and 12-yd. capacity load rooted shale on Guthrie-Marsch-Peterson Co. job. Caterpillar 95-hp. tractor draws tandem Le Tourneau scrapers, and similar tractor, equipped with special swivel socket for making contact with rear bumper, pushes scraper train while loading. Scrapers are loaded one at a time to avoid stalling, and rear scraper is loaded first to prevent buckling of train ahead of pusher. Forward scraper had capacity increased from 12 to 15 yd. by splicing 2-ft. welded section into bowl in contractor's shop.



30-CU.YD. SCRAPER (left) picks up 22-yd. payload on contract section of C. J. Langenfelder & Son, Rosedale, Md., building grade between Kittatinny and Tuscarora tunnels. Bucket is filled first in forward telescoped position and then is moved back to load rest of bowl. Contractor operates three of these big Le Tourneau scrapers 24 hr. a day and 7 days a week. Caterpillar 95-hp. low-gear diesel tractors pull scrapers, while fourth similar tractor, equipped with specially reinforced dozer blade, comes up against swivel bumper to act as pusher while each unit loads in distance of 300 to 400 ft. On 1,400-ft. maximum one-way haul on this day, scrapers average about five trips an hour and move nearly 1,000 pay yards per unit in 8-hr. shift.

PNEUMATIC-TIRED TRACTOR-SCRAPER UNITS (left) built by Austin-Western and powered with International diesel engines give good account of themselves for Conte-Eastwood, Inc., Pittsburgh, Pa., building grade on contract section near western terminus awarded to Ferguson & Edmondson Co., Pittsburgh. Units are designed for pusher loading; Caterpillar 75-hp. motor provides pushing power. Subcontractor operates eight of these 8-yd. cable-control scraper outfits, hauling 6 yd. of pay dirt per trip, and finds them particularly successful in earth excavation and economical on hauls up to 1,700 ft. Speed in high gear is about 15 m.p.h. On 600-ft. average hauls, each unit moves 800 pay yards in 14½ hr.

RIDING ON PNEUMATIC TIRES, high-speed Euclid 12-yd. tractor-scraper unit designed for pusher loading picks up 10 to 11 pay yards in 15-yd. heaped load on section east of Blue Mountain tunnel being graded by H. W. Shaull & Son, Mechanicsburg, Pa. Powered by 150-hp. diesel engines, tractor-scraper units travel up to 25 m.p.h. Two units on this job keep Caterpillar 95-hp. diesel pusher busy on hauls of 1,700 to 1,800 ft., making 70 to 86 trips per unit in 7-hr. shift. Another pair of Euclid 12-yd. tractor-scrapers is working on turnpike for L. M. Hutchison.



TRAVELING CRANE swings girder from railroad flat car into place for superstructure of Sacramento River crossing for relocated main-line of Southern Pacific R.R.

Railroad Relocation

AT SHASTA DAM INVOLVES 12 TUNNELS AND 8 BRIDGES

ONE OF THE LARGEST RAILROAD BUILDING JOBS in the United States in recent years is under way in northern California as a result of construction of 560-ft. high Shasta dam by the U. S. Bureau of Reclamation. Twelve tunnels and eight major bridges are included in the 30 mi. of new main line of the Shasta Route of the Southern Pacific Company being constructed around the site of the future Shasta reservoir.

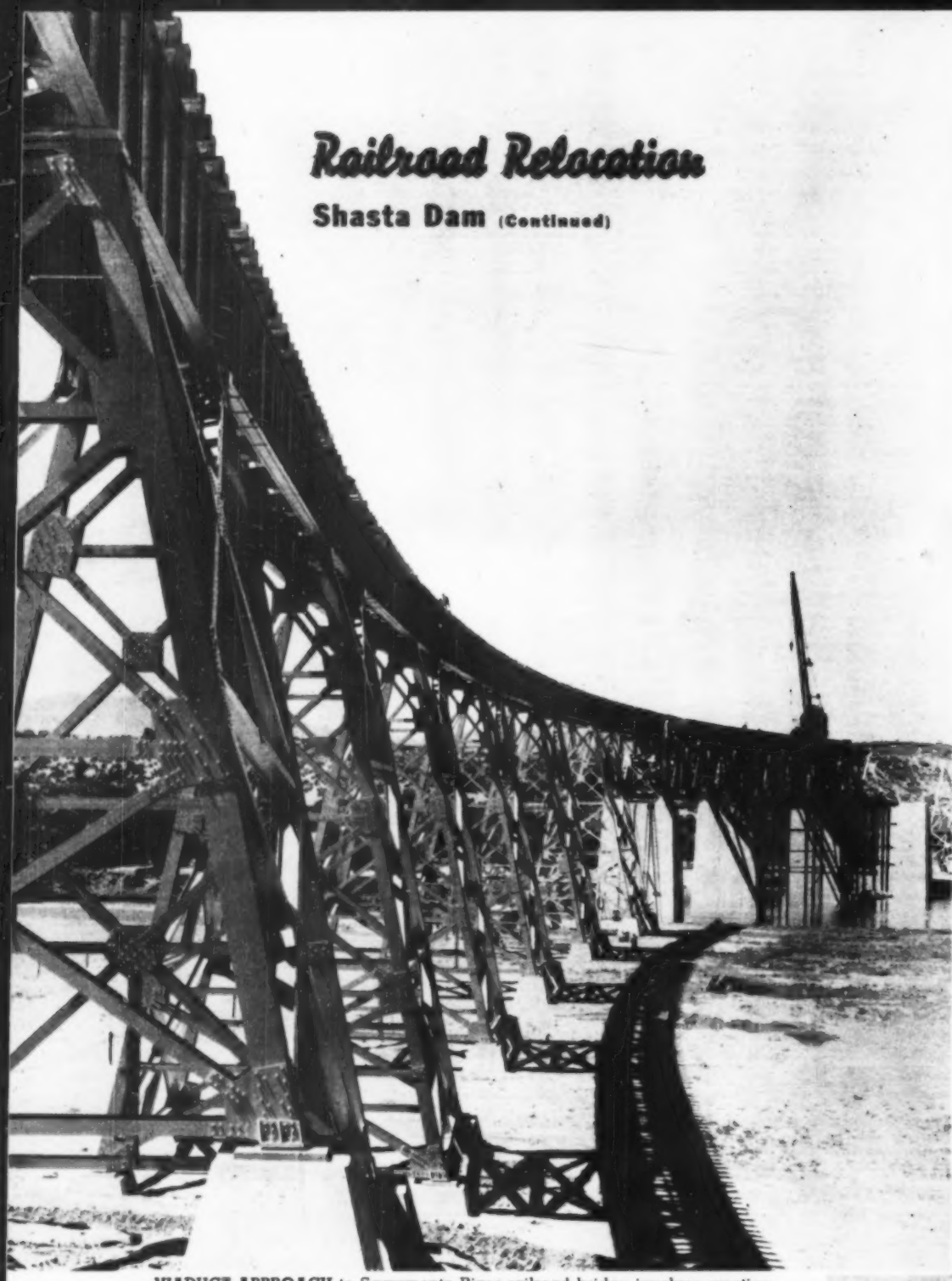
Commissioner of Reclamation John C. Page reported last month to Secretary of the Interior Harold L. Ickes that railroad work is progressing under contracts totalling $7,202,590 covering all of the roadbed grading, all of the tunnels, and five of the bridges.

A new $1,857,000 contract has recently been awarded by

(Continued on page 52)

Railroad Relocation

Shasta Dam (Continued)

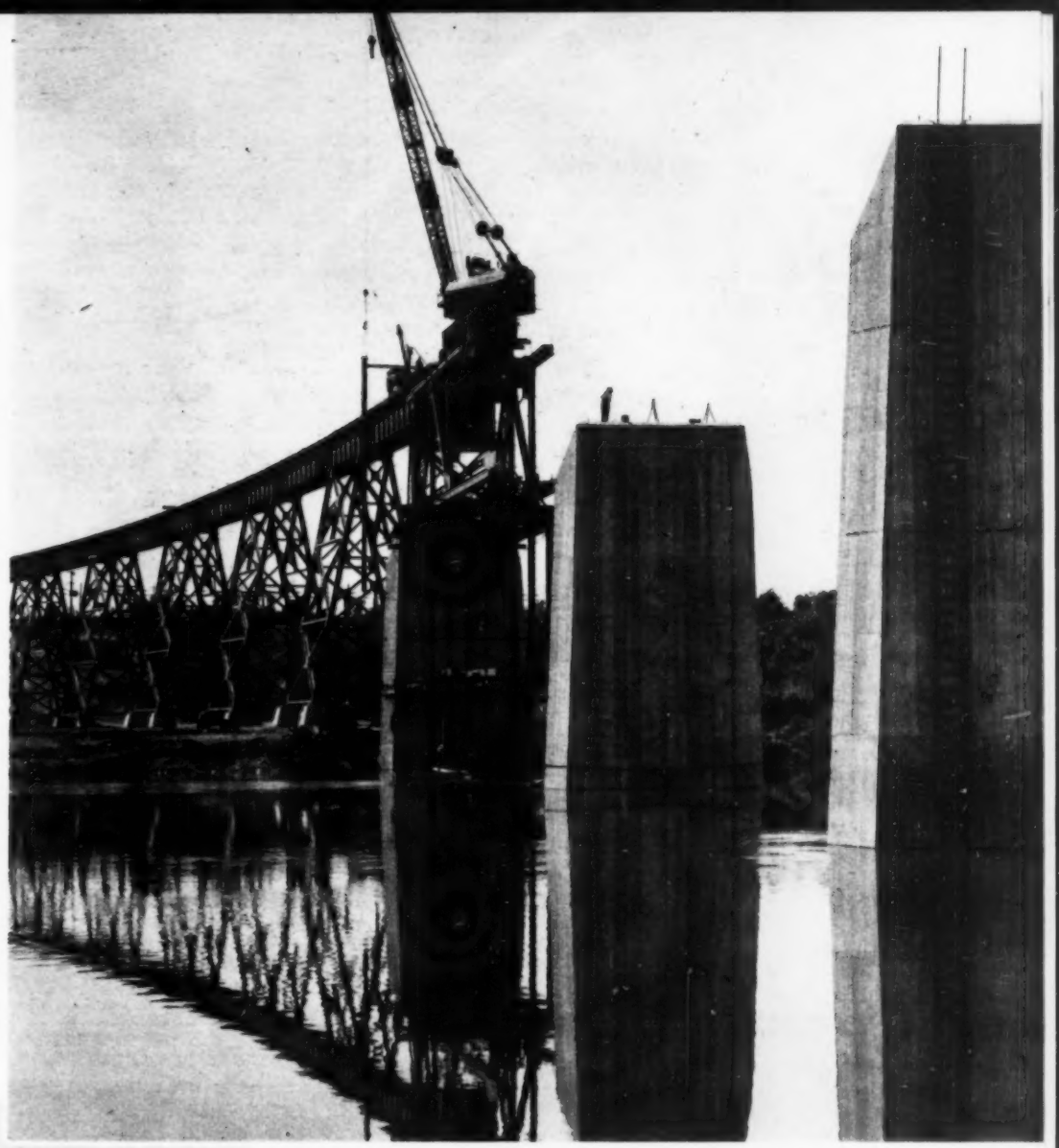


VIADUCT APPROACH to Sacramento River railroad bridge involves erection of 6,000 tons of steel on 152 concrete piers. The structure, one of eight major bridges included in railroad relocation, is 4/5 mi. long.

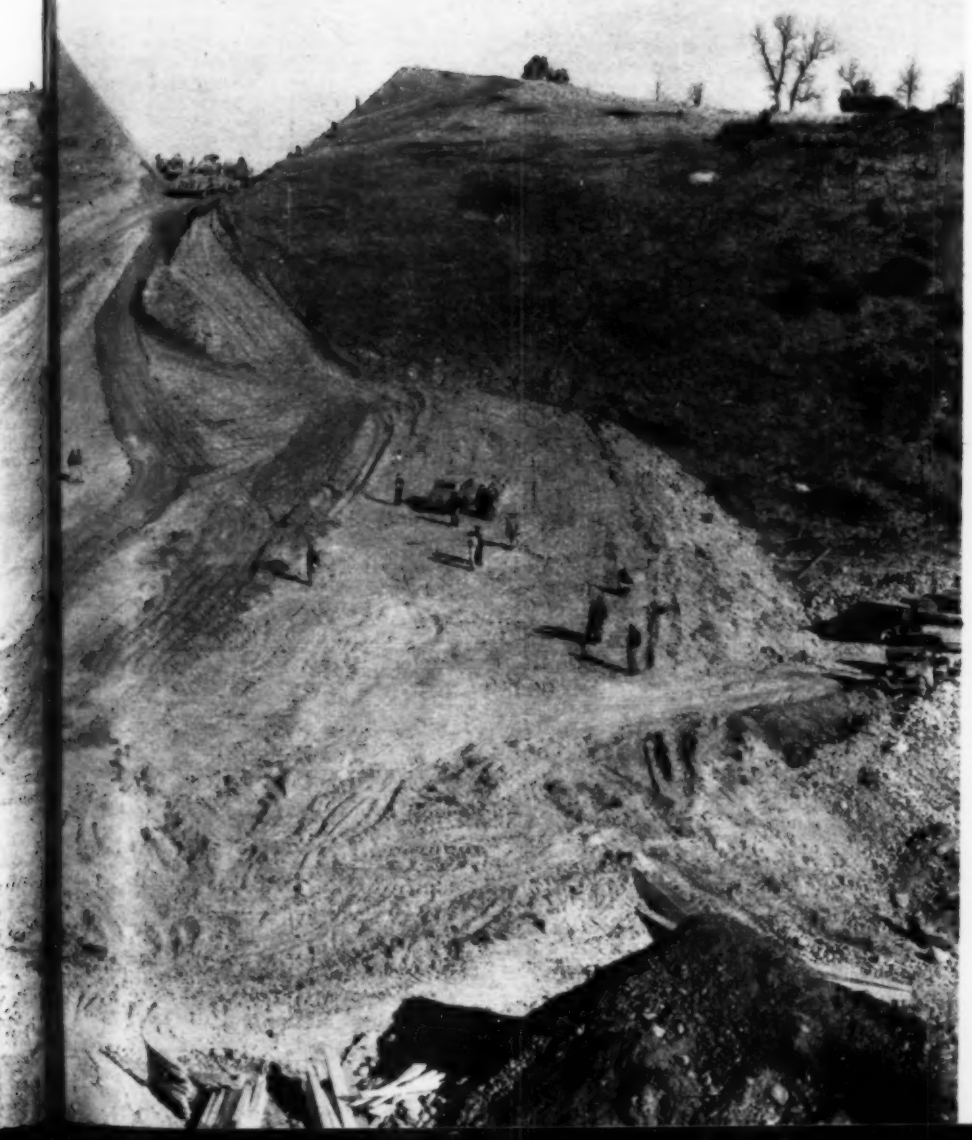
EXTENSIVE GRADING OPERATIONS (above and below) are involved in the 30-mi. relocation of the Southern Pacific Railroad around the site of the reservoir which will be created by the construction of Shasta dam. The contractors working a

CARRYALL SCRAPERS (below) are busy on grading for railroad relocation at point north of Boomtown. Trench across line is for construction of culvert.

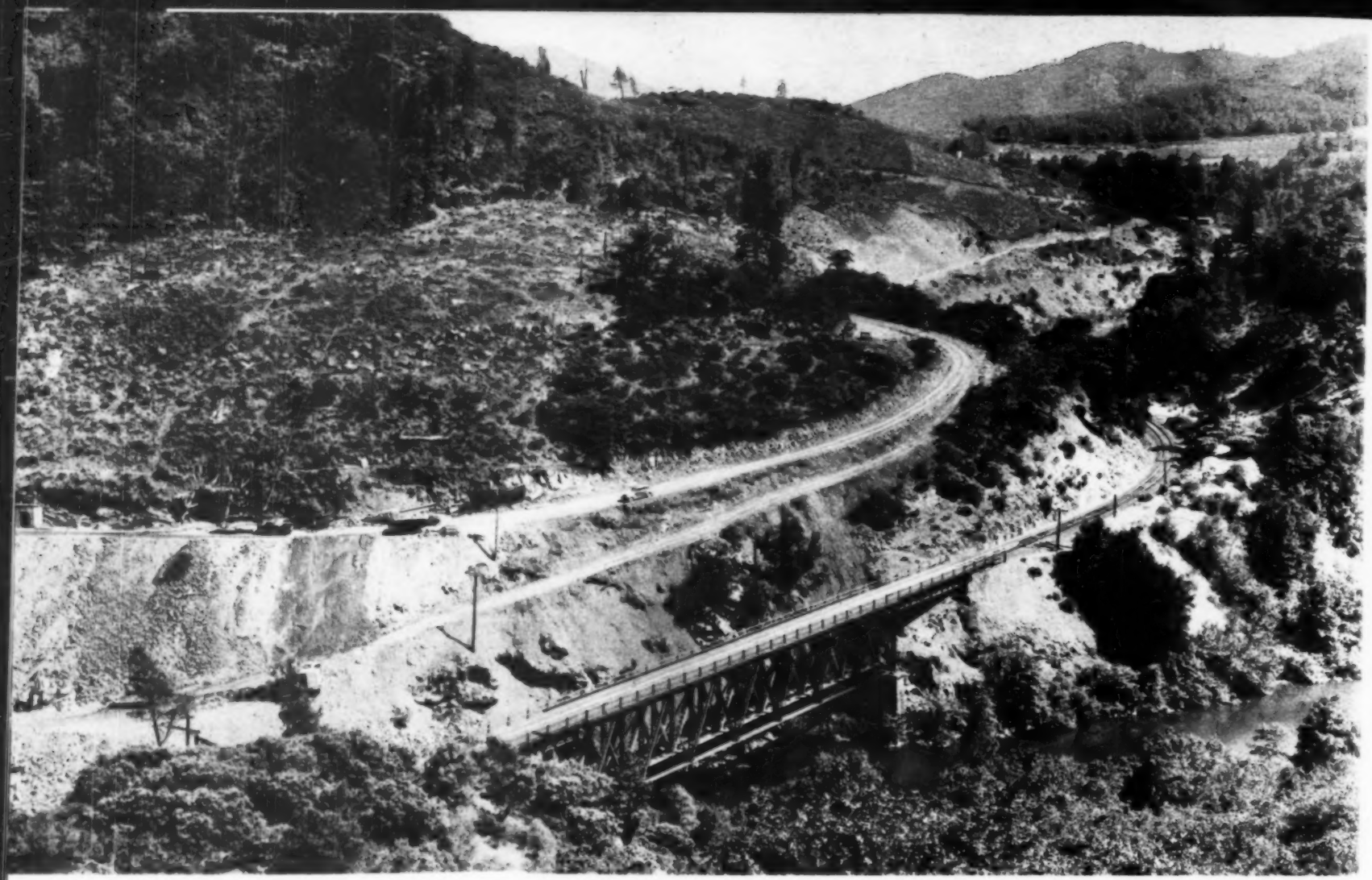
mile or so north of Redding, Calif., are making use of tractor-scraper outfits, supplemented by bulldozers, for handling cuts and fills in the vicinity of Sulphur Creek.



BRIDGE ACROSS SACRAMENTO RIVER, near Redding, will carry rerouted line of Southern Pacific R.R.

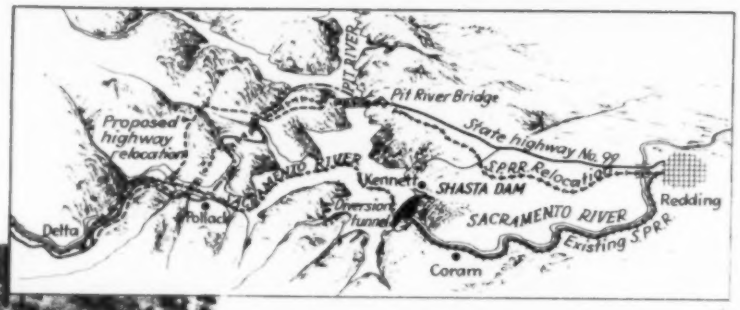


HOLING THROUGH OF TUNNEL NO. 11 (below) is marked by hand clasp by Eric Pearson (left) shift boss and Jack Nelson, inspector.

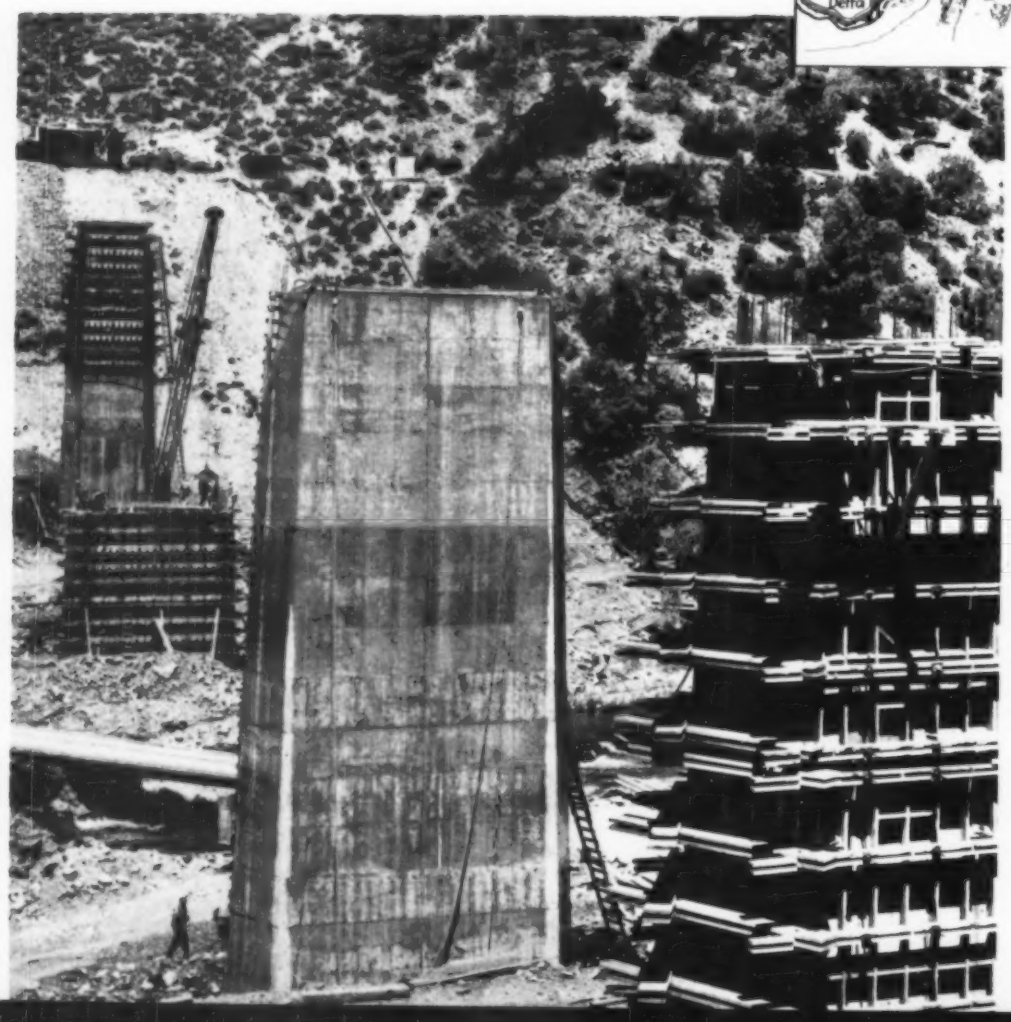


TOPOGRAPHY OF COUNTRY along Sacramento River, showing north portals of new railroad tunnels No. 12 (in foreground, at left) and No. 11 (in middle background, at right). View is looking down on Sacramento River from point above Fourth Crossing bridge site near Delta. Existing Southern Pacific bridge and track are in foreground.

Shasta Dam (continued)



OLD AND NEW ROUTES of Southern Pacific Railroad in vicinity of reservoir which will be created by Shasta dam on Sacramento River. Existing railroad along Sacramento River canyon, between Redding and Delta, passes Coram, Kennett and Pollack. New 30-mi. railroad route and state highway will cross Pit River arm of Shasta reservoir on high double-deck bridge, rejoining present railroad near Delta. New reservoir will also require relocation of highway.



TALL CONCRETE PIERS (left) for Third Crossing bridge across Sacramento River near Delta. In upper left portion of photo, (just above crane boom) is shown south portal of new railroad tunnel No. 11.

(Continued from page 49)

the Government for building the last 5-mi. section, including the remaining five tunnels. Bids were opened in Sacramento in August for erecting two more bridges. Mr. Page said the only feature of the relocation yet to be advertised for construction is the huge double-deck Pit River bridge which will carry both the railroad and U. S. Highway 99 over an arm of the reservoir. Bids are ex-

pected to be called for the Pit River bridge this Fall.

Meantime, to permit excavation to proceed in the Sacramento River Canyon for the foundation of Shasta dam, which is to be the major structure of the vast Central Valley reclamation project, railroad traffic on the existing line has been diverted temporarily through an 1,820-ft. by-pass tunnel which was bored under the west abutment of the damsite 12 mi. north of Redding, Calif.

Connecting California with the Pacific Northwest, the present line of the Southern Pacific, built in 1884, winds up the Sacramento River Canyon out of Redding, past the damsite and through the reservoir area. Thirty-seven miles of this line between Redding and Delta Station, Calif., are to be replaced by the new line which will be 7 mi. shorter and will have 5,000 deg. less curvature. The passenger train running time is expected to be reduced about 45 min.

Work was started on the by-pass tunnel at the damsite in June 1938, on the general contract for Shasta dam and power plant in September, and on the permanent railroad relocation in October. The by-pass tunnel was holed through in March 1939 and completed for use by railroad traffic in June, thereby permitting excavation operations for Shasta dam to be extended to the base of the west abutment which formerly was occupied by Southern Pacific tracks.

Trains are expected to use the by-pass tunnel for at least two years while the permanent relocation is being constructed east of the canyon route. Meantime, the excavation for Shasta dam can be completed and some preliminary concrete placed at the base.

When the new 30-mi. railroad is completed and opened to traffic, probably about September 1941, the existing canyon line will be abandoned and the by-pass tunnel at the damsite will be available for river diversion while concrete is being raised in the 560-ft. high dam. For this contingency the by-pass tunnel has been lined throughout with concrete. It is a horseshoe-shape bore, 28 ft. high and 26 ft. wide, and passes under the damsite a lateral distance of 725 ft. from the river.

The first unit of the permanent railroad relocation, a 0.8-mi. bridge across the Sacramento River at Redding, is almost completed. About 6,000 tons of structural steel were shipped west from Gary, Ind., for this bridge. The last girder was placed July 28.

Several miles of the roadbed have been graded in different sections. Two of the 12 tunnels have been holed through and muckers are boring underground in several others, two of which are a ½-mi. each in length. The entire railroad relocation involves almost 4,000,000 cu. yd. of excavation, driving 19,000 ft. of tunnels, erecting 29,000 tons of bridge steel, and laying 6,000 tons of rails.

STEEL LINER PLATES are used to support the ground in one of the twelve tunnels involved in the Southern Pacific Railroad relocation.

BLASTED ROCK IN TUNNEL NO. 2 (right), one of 12 tunnels involved in railroad relocation project, is scooped up by electrically operated shovel for loading into muck cars.

DUAL PURPOSE TUNNEL (below), 1,820 ft. long, bored under west abutment of Shasta dam, serves to by-pass Southern Pacific Railroad around site of construction work and later will be used for river diversion during construction of dam. Lined with concrete, tunnel is 28 ft. high, 26 ft. wide.

INVESTIGATE THESE

3 Big Profit-ma

EXTRA POWER FROM ANTI-KNOCK GASOLINE

— Now the quick-firing, extra power in 60-70 octane gasoline (available every where without premium) can be yours. In Allis-Chalmers new higher-compression tractor engines this clean-burning, powerful fuel provides 5 to 9% more power than ordinary gas ... and cuts gas consumption as much as a gallon an hour.

TIME AND BIG LUBRICATION BILLS SAVED

— New Allis-Chalmers Positive-Seal truck wheel assembly requires lubrication *only once in every 200 hours!* No more ½-hour stops each shift to grease front idlers and rollers. You gain a full shift or more every 200 hours on greasing time alone ... and cut track lubrication costs 80 to 90%. This great money-making feature is available only on A-C tractors.

TAKE FULL ADVANTAGE NOW OF THESE PROFIT-MAKING FEATURES. ASK YOUR ALLIS-CHALMERS DEALER TO SHOW YOU WHAT THESE B

Gas "5" and Leaning Frame Grader cutting ditches for a new road in Missouri. Like many others, this user saved enough on the first cost of his A-C gas tractor to buy fuel for a year.

...aking Advantages

-F-A-S-T-E-R - P-O-W-E-R

—Move more yardage every shift with the Faster Power of A-C Tractors. Quick pick-up and fast maneuvering ability save time on pit and fill. Higher travel speeds ... the "S", for example, works at speeds up to 6.37 M. P. H. or half a mile faster than the next fastest tractor in its power class ... gain profitable extra dirtmoving trips every shift.

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No longer need you be limited to one fuel. With Allis-Chalmers you can select a tractor to use whatever fuel is best in your locality... gasoline, Diesel oil or butane... get a full, even flow of power from any one of the three

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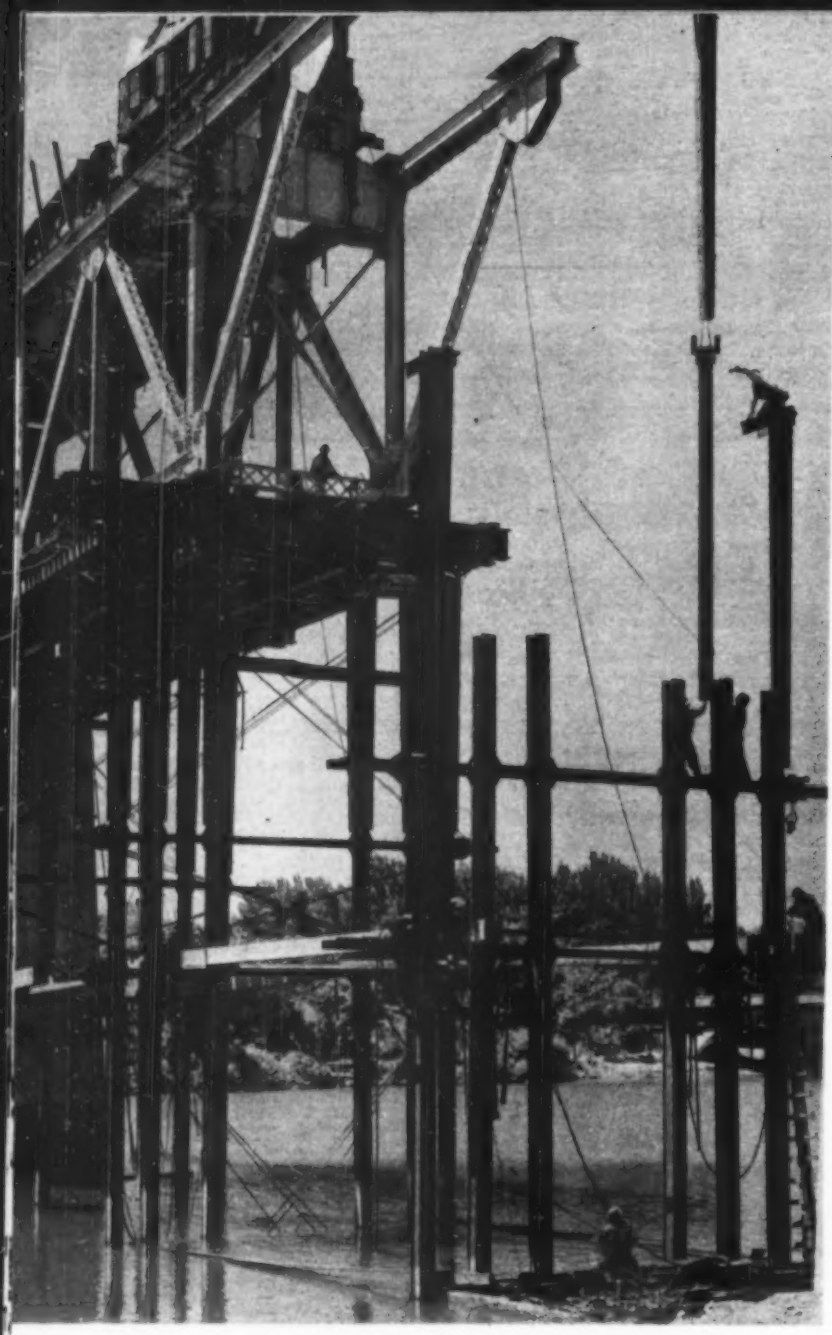
TRACTOR DIVISION—MILWAUKEE, U.S.A.

TRACTORS, ENGINES, ROAD MACHINERY

.. IT DOESN'T COST .. *it Pays!*

How They Did It

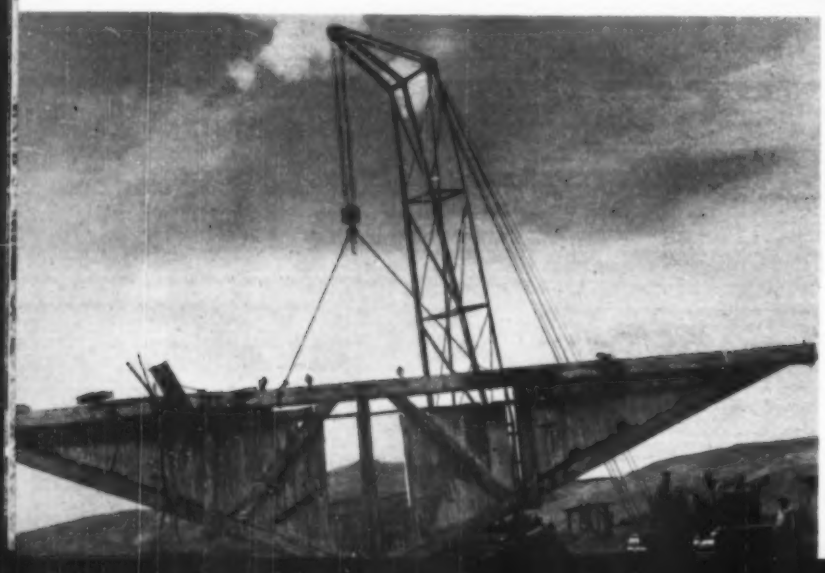
CONSTRUCTION DETAILS *For* *Superintendents and Foremen*



STEEL FALSEWORK is employed to aid erection of railroad truss bridge across Sacramento River in California. This is one of eight similar structures involved in 30-mi. relocation of Southern Pacific Railroad line around reservoir to be created by Shasta dam, main construction feature of U.S. Bureau of Reclamation's Central Valley project.

WON'T BLOW OVER. (Right) This swing sign for diverting traffic around work under way, designed by Industrial Products Co., of Philadelphia, has frame suspended by free pivot on each side, allowing it to move with varying wind pressures. It is made of steel channels and Tees, electrically welded. Can be folded up for storage in stacks.

TRACTOR CRANE (below) proves handy piece of equipment in dismantling abandoned saw-mill. H. E. Cornell, contractor, of Boise, Idaho, with 40-ft. Le Tourneau tractor-operated unit, carries heavy trusses (62x15 ft.) to location for reconditioning for county bridge construction. Loads of 12 tons were readily lifted with this outfit.



FOR APPLYING COTTON FABRIC REINFORCEMENT to bituminous runways at Pocatello municipal airport, Idaho, this carriage is adopted from cart previously used to transport concrete pipe. U-shaped angle was placed across short angles which, in pipe plant, carried pipe jacket. Hooks were bent at bottom of U-angle to carry piece of 1¼-in. pipe, which was thrust through roll of cotton fabric. Another piece of pipe was attached to end of handle so that it could be pulled by two men walking on either side of spread of oil. Fabric was spread on primed runway surface and tacked down with roofing nails. — Photo from R. F. HAMILTON, city engineer, Pocatello, Idaho.

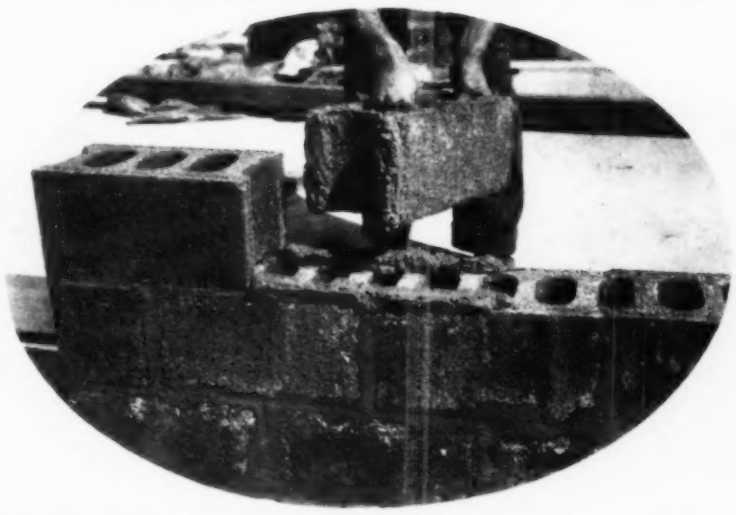
CHANGING TO DIESEL POWER. Colonial Sand & Stone Co., of New York, replaces gasoline engines on 62 of its Mack trucks with four-cylinder Cummins diesel engines, in addition to purchase of 50 more six-cylinder diesel power units for new trucks. Photograph above shows mechanic at work in shop installing one of four-cylinder diesel units in truck from which original gasoline power unit has been removed. At right is illustration of job of power unit substitution completed.

TO FLOODLIGHT NIGHT OPERATIONS in building Prado dam, Prado Constructors (a consolidation made up of Callahan, Guthrie-Marsch-Peterson, Shirley and Condon organizations) use these two portable towers, each powered by Caterpillar diesel engine and 15-hp. electric generator. One tower has eight 1,000-watt lamps and other eight 1,500-watt lamps. Towers are moved from place to place on job by tractor and tow chain.

WANTED — Photos of Details

The Editor of Construction Methods wants photographs or sketches illustrating interesting DETAILS of method or equipment and will pay for those he finds acceptable for publication.

Hasn't your job produced some DETAIL that might be illustrated on this page? Send along a picture of it; we'll return it promptly if we can't use it.



MORTAR JOINTS in concrete masonry wall construction, according to specifications recommended by Portland Cement Association, should not be more than ½ in. thick, with full mortar coverage on vertical and horizontal face shells, as illustrated in accompanying illustration of approved face shell bedding. Vertical joints must be shoved tight. Mortar joints should be struck off flush with wall surface and, when partially set, compressed and compacted with rounded or V-shaped tool.

DOUBLE DUTY is performed by this ⅜-yd. Bucyrus-Erie dragshovel **(below)**, operated by Charles W. Sabash, contractor, of Lincoln Park Mich. After machine excavates short section of trench 9 to 12 ft. deep in sandy soil, it picks up length of concrete pipe with aid of chain sling and sets it accurately to line and grade before cut has chance to fill up.

HORIZONTAL CORE DRILL in east heading of Tuscarora tunnel successfully drills 1,450 ft. through nearly vertical rock strata to west heading, making what is probably a record for horizontal drilling. Sprague & Henwood, Scranton, Pa., contractors.

Diamond Drills EXPLORE ROCK STRATA IN TURNPIKE TUNNELS

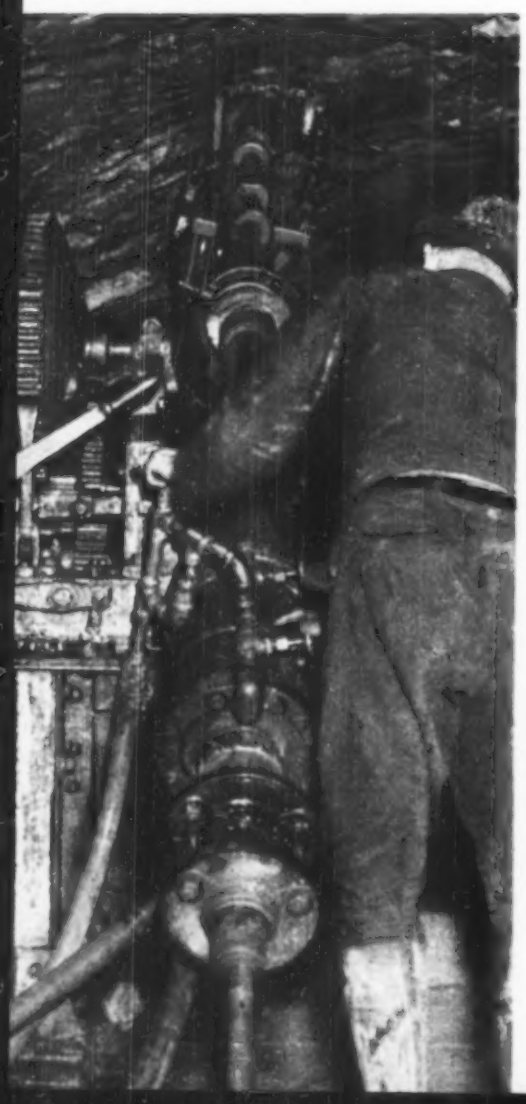
AN EXPLORATORY CORE-DRILLING CAMPAIGN to determine the character of the rock to be excavated in Pennsylvania Turnpike tunnels preceded the taking of bids for tunnel construction. Vertical, horizontal and inclined core-borings were drilled during this investigation. The type hole depended on the dip of the rock strata and the special problems that arose during the progress of the work.

Seven tunnels will be utilized in penetrating mountain ridges on the highway route. These tunnels were partially excavated by contractors for the South Penn R.R. in the '80's. Core-boring investigations applied to the undriven portions of the seven tunnels and to a proposed new tunnel, since eliminated in favor of open-cut construction.

Horizontal core borings were drilled between headings in three tunnels penetrating rock strata which have a nearly vertical dip. Horizontal drilling was essential to obtain a comprehensive picture of these nearly vertical strata.

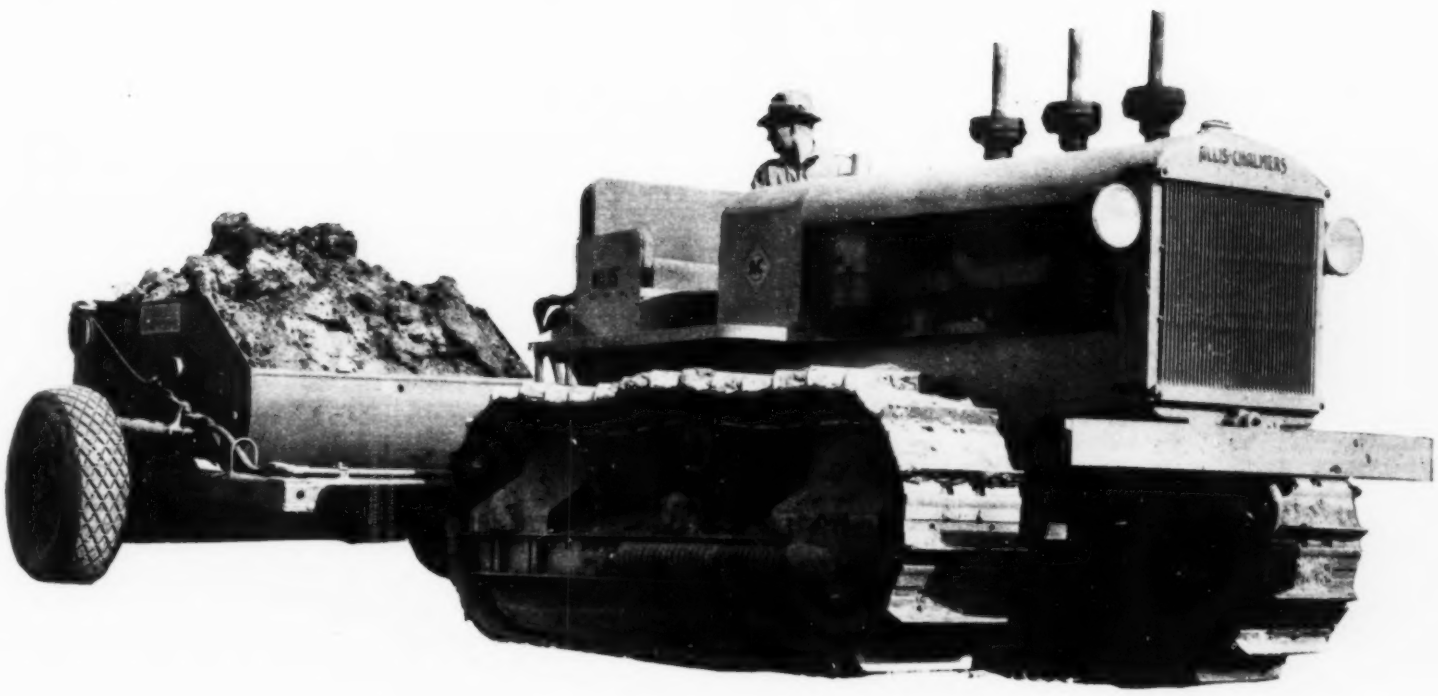
(Continued on page 98)

INCLINED BORE (below) to explore wet sand seam 179 ft. from face is drilled in west heading of Kittatinny tunnel. Core-borings are drilled at various inclinations in concentric cone patterns to investigate extent of sand seam. Sprague & Henwood, contractors.



VERTICAL DIAMOND DRILLING (below) at Laurel Hill tunnel is typical of core-boring explorations where medium to gentle dip of rock strata requires vertical penetration for successful drilling. Tinney Bros., contractors.

ROCK CORE (below) is removed from core barrel and placed in temporary trough for later transfer to core box. In foreground is diamond-studded bit of core drill.



CAN YOUR EQUIPMENT MOVE MORE YARDAGE?

"Yes," Says the Operator

By RICHARD EICHACKER
Elmhurst, L. I., N. Y.

GIVEN A PIECE OF EQUIPMENT embodying good mechanical design, the output of the unit depends upon the proficiency of the operator. Average overall efficiency of operators is high, as job progress records show, but production could be further increased by some simple improvements in design of equipment and management of construction work. During five years' experience as an equipment operator, swapping stories with other men filling similar jobs, I have learned that operators are practically unanimous in their opinion of the petty annoyances and inconveniences which hinder them daily in their work. A general airing of common mistakes may be beneficial to all concerned.

Mechanical Progress — Machinery in recent years has become more powerful and more efficient, output has been increased, and losses due to normal wear and breakage have been reduced. During the process of improvement, the designer until quite recently has forgotten the most important part of the machine, namely, the operator. It is just being realized that any convenience for the benefit of the operator results in an increased amount of accomplished work.

Human Factor — Machinery is tireless, but the strength and endurance of the operator, although variable to a certain extent, have their limits. The human body can stand just so much; if an additional burden is placed upon it, it begins to tire and finally fails completely.

Machinery is intended to aid the operator in the execution of a particular job, but in many cases designers apparently have lost sight of this fact and have thought of the operator as a tireless mechanical man. These designers place more emphasis on the efficiency of the machine than on the comfort of the operator, forgetting that the operator is the brains of the outfit.

Because any improvement in the handling of the machine is of great benefit to the contractor, it is essential to take into consideration the comfort of the operator. To be specific, let us consider some of the features of a tractor and suggest some possible improvements.

Tractor Operators — The retiring age of a tractor operator normally is between thirty-five and forty. Early retirement is necessary, not because older men lack the ability and knowledge to operate, but because they have grown too old to "stand the gaff." It takes a man in his prime to handle stiff steering clutches for 8 hr. and to maneuver in his seat like a contortionist when he is operating a scraper. Tractors are built only for tough men.

Just recently one tractor manufacturer has improved the operation of the steering clutches by including a booster arrangement which greatly reduces the strength required to turn the tractor. Other manufacturers have not yet got around to improving this feature, which is so important to the operator and to economical clutch wear.

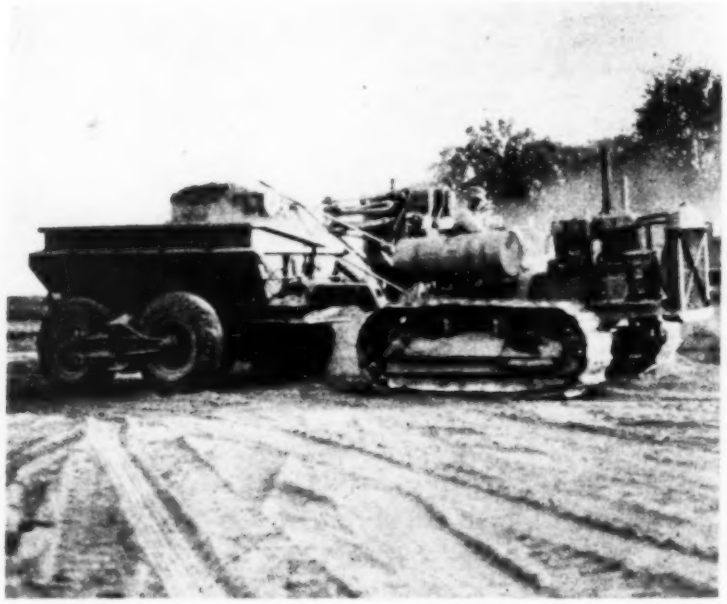
Seat Design — Even on the most expensive tractors, operators find little comfort. The type of spring seat has not varied since cushioned seats were introduced. Essentially, the seats are designed for durability; they are expected to last as long as the tractors.

Tractor seats in general are as wide as the main body of the machine. This exceptional width is a convenience to the operator when he has to twist around in the seat to operate the power control of a scraper, but the wide seat is a great disadvantage in wet weather. What operator has not violently cussed the manufacturer when on a rainy day the depression in the seat under the operator acted as a sump, collecting enough water to soak him to the skin? Nothing is more unpleasant than sitting in a puddle for

MORE COMFORT, MORE YARDAGE

IN STRIVING TO INCREASE CAPACITY and output of construction equipment, manufacturers and contractors sometimes overlook the important human element that sets the pace for the machine. Noise, heat, dirt, discomfort and muscular strain exact a heavy toll in physical and nervous energy of operators, particularly on the large, mobile units; but these drains on operating efficiency receive only secondary consideration from many contractors and machinery designers. How is an operator, caked with dust, baked by heat, fatigued, thirsty and deafened by noise to deliver maximum production during the last hours of his shift? In the accompanying notes, an experienced operator looks at construction equipment from the point of view of the man in the driver's seat and suggests some inexpensive remedies to correct fatiguing conditions and improve daily output.

STOUT CAB on diesel tractor demonstrated by Salesman Joe E. Brown in motion picture, "Earthworm Tractors," affords protection against sun and light drizzle, but purchaser must buy set of curtains if he wants operator to stay dry in driving rain.



SHIELD OF INSULATING BOARD between gasoline motor and operator would reduce stifling heat in summer.

8 hr.; a wet seat certainly has a dampening effect upon an operator's spirit.

Spring seats have the further disadvantage that, while the cushions are resilient, the backs are stationary. While the operator jounces up and down on the springs, the stationary back pushes his clothing up his spine.

As a suggestion which might solve all the difficulties, tractors should be equipped with hydraulically cushioned seats similar to those used in modern buses. The seat should be designed to swivel on the supporting post, thus giving the operator easy access to power controls behind him. In my own experience, substitution of a hydraulically cushioned single seat for the conventional type has proved a great advantage in tractor operation.

Operator's Cab — As a defense against the discomfort of wet seats, a tractor salesman might answer that all machines should be equipped with cabs. Although cabs do help a little in a light drizzle, with no wind, in a driving rain a cab is of little value unless a good set of curtains has been purchased with it. Good curtains are rare on construction jobs. Frequently I have noticed that, although a contractor has paid almost $10,000 for a tractor, he feels that an additional $25 for curtains is an unnecessary expense.

Metal cabs offer the best protection against the weather, but their benefits are accompanied by several annoying disadvantages. During cold weather, the heat given off from the motor is a comfort, but in hot weather the heat becomes stifling, as the roof of the cab reflects it upon the head and body of the operator, bringing forth streams of perspiration and exclamations of disgust. At the same time, the metal roof reflects and increases the roar from the exhaust pipes.

To reduce both the heat and the noise, a lining of insulating board under the roof would add greatly to the comfort of the operator. With this improvement, he would not think it preferable to remove the cab and sit exposed to the hot sun and drenching rain.

Engine Exhaust — Whether covered by a cab roof or not, the operator still must contend with the deafening noise of the exhaust pipes, which usually are located directly in front of him. No type of muffler has been used to decrease this source of irritation.

Bulldozer Visibility — Good visibility is another factor to which little attention has been paid. When I first saw a bulldozer, I wondered how the operator could possibly see what he was doing. I soon learned that he couldn't and that it took several weeks before a man could become sufficiently experienced in the handling of the blade to do an acceptable fine-grading job.

Most bulldozer blades are so constructed that only the top of the blade can be seen from the operator's seat. To see the bottom of the blade, the operator has to lean over the side of the seat in a strained, awkward position and look down between the motor and the crawler tracks.

When the bulldozer blade is carrying a large load, the motor has a tendency to climb up off the front main spring and blot out the little remaining view of the ground. The operator then must employ all his senses of level and distance to know when and how to finish grading off the load of earth.

Heat and Cold — Extreme conditions of heat and cold have a telling effect upon the amount of work accomplished. On cold winter nights I have often seen operators of diesel-powered auto patrols compelled to halt their work several times during the night shift to warm themselves at open fires. Although their cabs were weathertight, the amount of heat given off by the diesel motors was negligible. I was more fortunate, as my grader was powered by a gasoline motor

which gave off enough heat to make working conditions quite comfortable.

Conditions of the other extreme were experienced by a working companion of mine while operating a back hoe last summer. With the temperature above 90 deg. F. in the shade, the sun poured down upon the metal roof of his cab and seemed to concentrate on a spot directly above his head. A gasoline motor just 4 ft. behind him completed the encirclement of heat waves. Although I felt sorry for him in his "hot tin can," I realized that he was not alone in his discomfort. Thousands of operators work in temperatures ranging from subtropical to frigid without any special effort being made to improve operating conditions or to reduce job interruptions.

Water Boy — Unless a job is of considerable size, the average contractor seldom thinks of employing a water boy. When a water boy is added to the payroll, he seems to make himself scarce as hen's teeth. Ordinarily, an operator must content himself with two visits a day, one in the middle of the morning and the other in the afternoon. A man can almost "spit cotton" without having much done about it, but as soon as the water in the radiator of his machine runs a little low and steam starts to rise, one may be sure that the boss will order the radiator to be refilled immediately. Even though the water in the radiator has run a little low, the machine can still produce the same amount of work, but once an operator becomes hot and thirsty there is a marked decline in both the amount and the quality of the work accomplished.

Cake and Coffee — Most contractors have heard of the efficient methods used to stimulate production in modern factories, but any idea of a recess with refreshments on a construction job would be considered a joke. While acting as superintendent for the Edward Acker Co., Setauket, L. I., on a road job near Patchogue two years ago, I had occasion to learn the value of a recess. To drag down the slopes of a deep cut, we had hired from the South Shore Contracting Co. a dragline operated by Lee Coffin, one of the best dragline operators that I have ever seen. About 10 o'clock of the first day I went to town and brought back some coffee and cake for the two of us. We discussed the job during a 10-min. recess, and I then left him for the rest of the day. To show his appreciation for this small favor, he completed the job in just one-half the time that had been allowed for it.

Daily Production Records — On a job of the William P.

(Continued on page 98)

DUST CONDITIONS for this operator are mild at the moment. Ordinarily, dust from crawler tracks rises and encircles operator, making respirators necessary on many jobs. Fenders and running boards would protect him from dust, stones and pieces of pipe thrown up by crawlers.

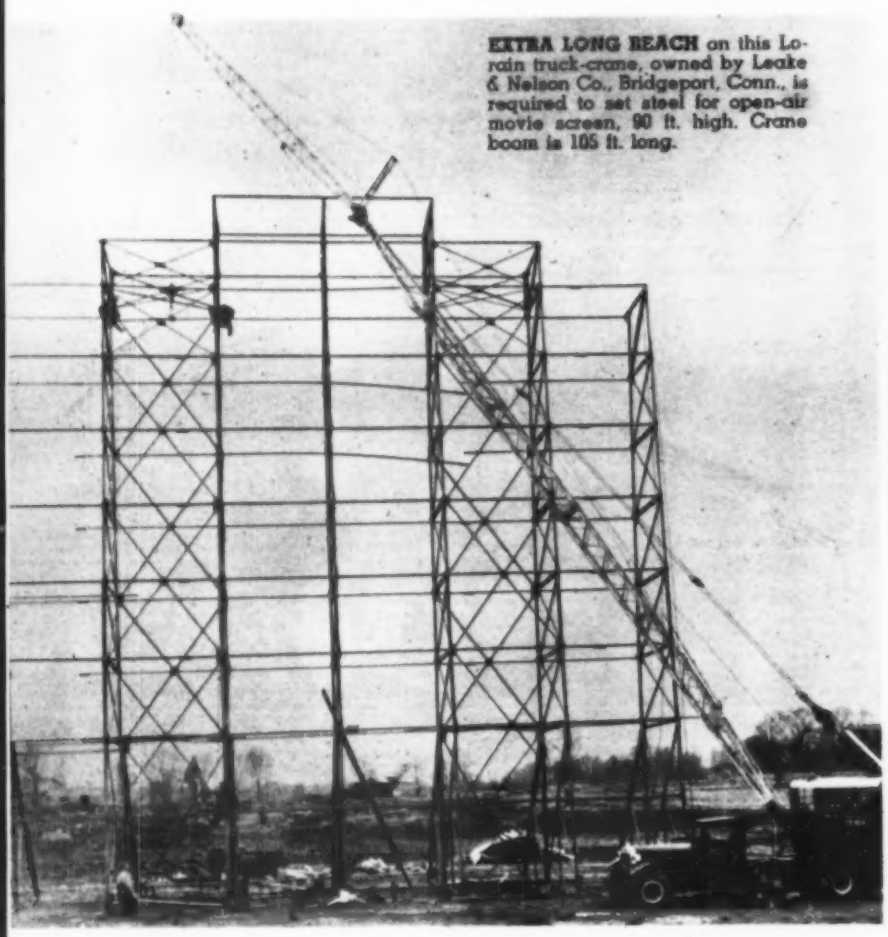
EXPOSED TO SUN AND RAIN, operator performs his job at mercy of elements, and production rises and falls with vagaries of weather.

POOR VISIBILITY of bulldozer work keeps this operator literally on his toes. In grading edge of steep bank, dangers of operating without being able to see work are particularly evident.

IT TAKES A MAN IN HIS PRIME to handle steering clutches for 8 hr. and to maneuver in his seat when operating a scraper.

JOB oddities

FILMDOM'S TWO-FISTED STAR, VICTOR McLAGLEN, assumes role of tractor operator on a construction job in new RKO production "Full Confession." Picture centering around convict road gang reaches climax when big Allis-Chalmers tractor, with McLaglen at controls, plunges over embankment.

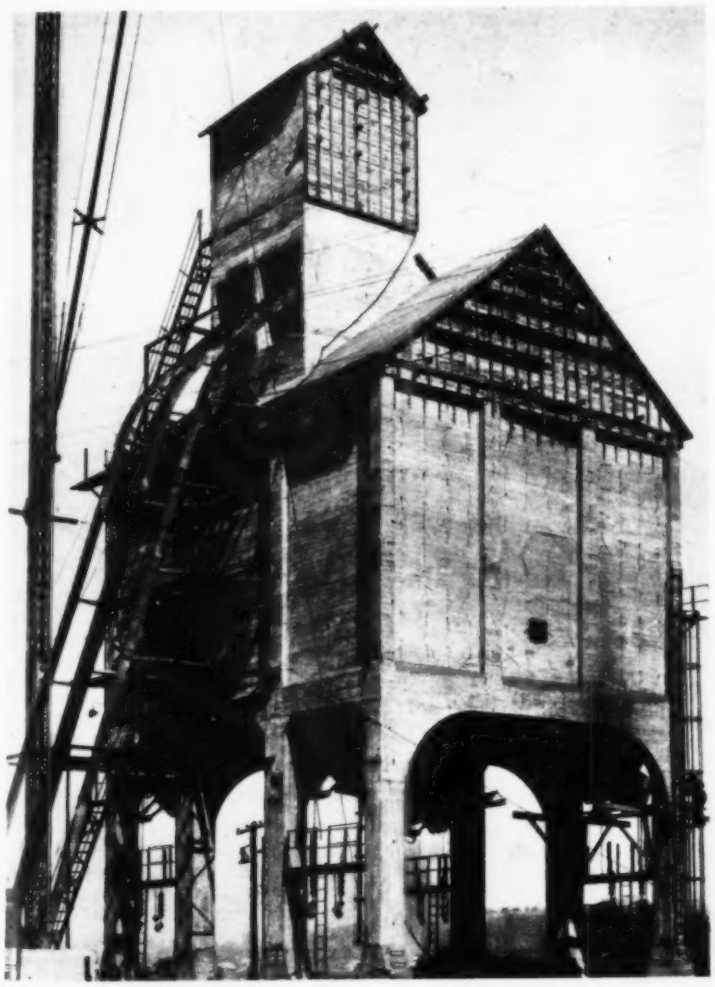


EXTRA LONG REACH on this Lorain truck-crane, owned by Leake & Nelson Co., Bridgeport, Conn., is required to set steel for open-air movie screen, 90 ft. high. Crane boom is 105 ft. long.

RAINBOW IN ROCK. Natural bridge across Aztec Creek at foot of Navajo Mountain in southern Utah, near Arizona state line, is 309 ft. high, has span of 278 ft. and is 40 ft. thick at top. Architecturally perfect in detail the rock arch is of reddish color, streaked with white.—Photo by JOSEPH MUENCH, from Arizona Highway Department.

NEW HIGHWAY-OPENING TECHNIQUE (left). This time officials of California Division of Highways, including FRANK W. CLARK, director of public works, (handkerchief in coat pocket) and COL. JOHN H. SKEGGS (at Clark's left) district engineer, watch sawing of ceremonial log barricade across newly completed Los Gatos-Santa Cruz highway.

TIMBER SHEETING AND BRACING hold railroad track in foreground while crane excavates for turntable. Beyond turntable are rows of concrete caps on caisson piers which will support engine pits and tracks of locomotive stalls.



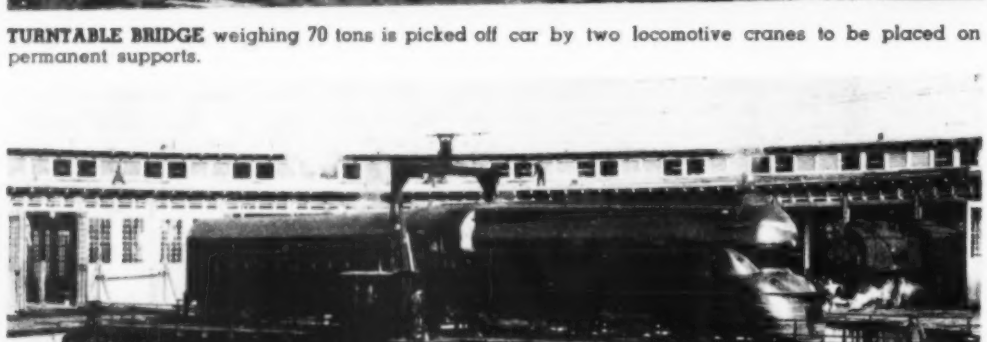
COALING STATION containing 1,000 cu.yd. of reinforced concrete provides storage for 750 tons of coal, which can be unloaded from cars at rate of 120 tons an hour by two 63-cu.ft. buckets operating on inclined hoist tracks.

125-FT. TURNTABLE AND 30-STALL ENGINE HOUSE REST ON *Concrete Caissons*

AS PART OF the Pennsylvania Railroad's program to provide facilities for both steam and electric locomotives at Harrisburg, Pa., the junction point between newly electrified lines to the east and existing steam lines to the west, McCloskey & Co., Philadelphia contractor, built a 125-ft. turntable, one of the largest in the world, and a 30-stall engine house resting on open caisson piers carried down to rock. These facilities, as well as a number of other structures such as a welfare building, a machine shop, a store and oil house, wash pits, ash pits and steam locomotive inspection and work pits were completed by the contractor in a 7-month working period between July, 1937, and February, 1938.

Other contractors were carrying on operations in the same area during the construction period, and the railroad continued to use tracks and existing facilities (such as two old enginehouses replaced by the larger new unit) up to the moment of actual dismantling. New facilities, in turn, were pressed into service as quickly as tracks could be laid into them, oftentimes weeks in advance of actual completion.

TURNTABLE BRIDGE weighing 70 tons is picked off car by two locomotive cranes to be placed on permanent supports.



STREAMLINED STEAM LOCOMOTIVE, first of its kind on Pennsylvania lines, takes ride on new 125-ft. turntable.

In spite of the confusion of conflicting demands and overlapping activities, the work was organized and coordinated by the railroad engineers and contractors to attain practical completion of all facilities before full electrical operation of the eastern lines started on Jan. 15, 1938.

Before work on the new enginehouse could be started, the railroad had to lay two new westbound tracks skirting the site. All trackwork, except that involving interlocked territory, was performed by the Arundel Corp., Baltimore, under a contract which also covered grading, drainage, water mains and two bridges, in addition to the demolition of a number of abandoned facilities such as enginehouse No. 2 and coaling wharf.

Caisson Foundations **— A total of 509 concrete caissons, 3 ft. and 4 ft. in diameter, sunk an average distance of 15 ft. to rock, support the enginehouse and turntable. A subcontract for the caissons was executed by the Foundation & Construction Co., Philadelphia. Before caisson work started, power shovels excavated the area to the top of caissons. The subcontractor used cylindrical steel shells 8 ft. long to support the walls while excavating the caissons by hand. Sinking progressed with the aid of self-priming centrifugal pumps and air hoists, as illustrated by an accompanying photograph.**

After a cylindrical shell had been

OPEN CAISSON PIERS for turntable foundation are sunk with aid of self-priming centrifugal pumps and of compressed-air hose lines to run clay spaces and hoists similar to one (indicated by arrow) mounted on trolley beam in background.

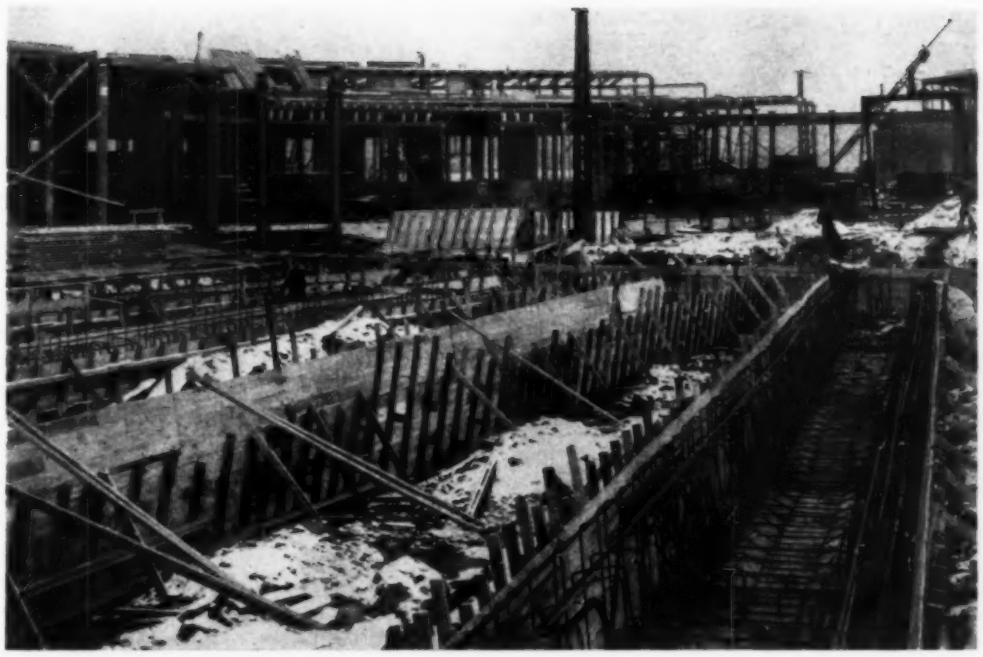
sunk its full length, a second cylinder of smaller diameter was started down inside the first. When necessary, the second shell was followed in the same way by a third. Air spades were used for cutting clay and shale, and the shells were seated without any blasting.

Enginehouse—Of the 30 locomotive stalls in the enginehouse, twelve are 120 ft. long and eighteen are 140 ft. long, designed to accommodate any type of locomotive now in use. Each stall is equipped with a work pit running its full length. Four stalls adjacent to the machine shop are fitted with an 80-ton drop table capable of lowering and raising the heaviest driving equipment on any modern steam locomotive.

Outside walls of the enginehouse are brick masonry. Above large wooden window frames set in the wall are concrete lintels cast in place. The entrance portal to each stall is framed with cast-iron columns and cast-iron lintels. With the exception of structural steel framing for the longer spans and monorail hoist above the wheel drop pits, all interior framing is of fire-resistant timber treated with chromated zinc chloride. To prevent settlement faults commonly found in old enginehouses, floor slabs of reinforced concrete are anchored to adjacent work-pit walls, which in turn rest on caissons.

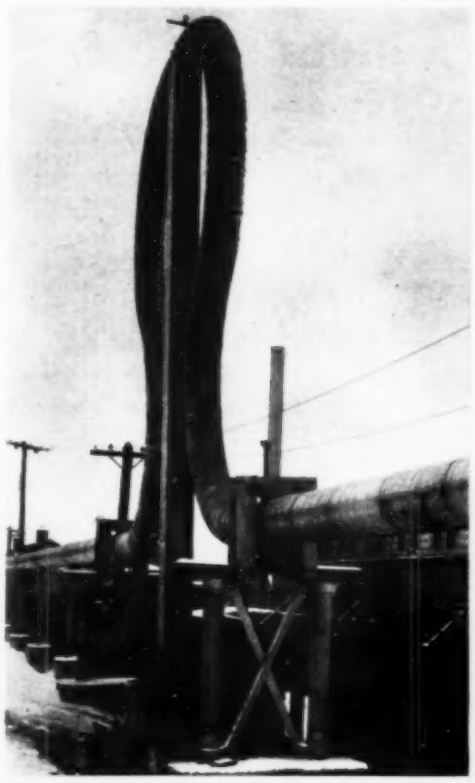
Turntable—Movement of locomotives in and out of the enginehouse is made possible by the 125-ft. turntable, de-

(Continued on page 100)

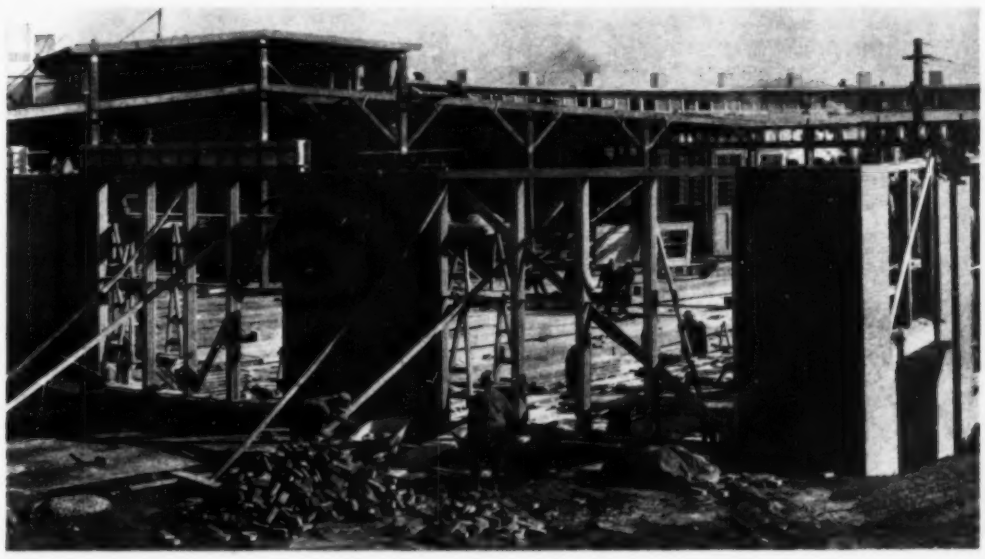


WORKING PITS of locomotive stalls are heavily reinforced to carry moving live loads between foundation piers. Structural steel frame of machine shop is being erected in background. Note cast-iron columns and lintels forming inner circular frame of roundhouse.

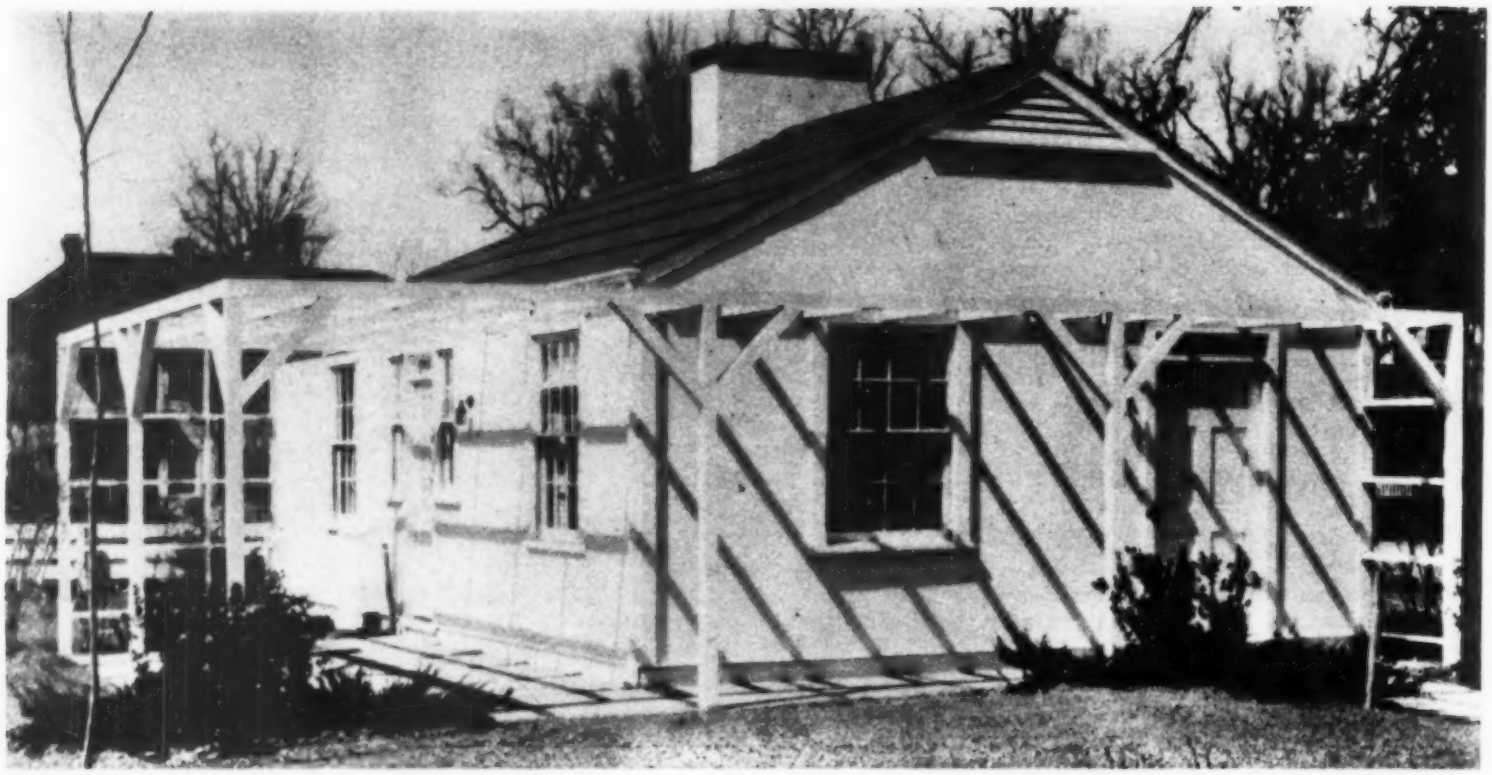
NUMEROUS DOWEL RODS protruding from walls of working pits will anchor floor slab to these structures, preventing unequal settlement.



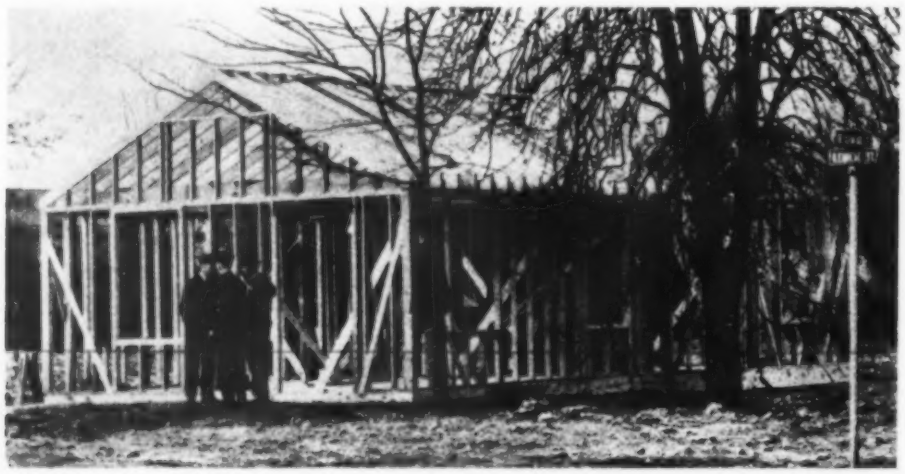
VERTICAL EXPANSION LOOPS take care of movement in 7,000-ft. steam pipe line where narrow right-of-way prohibits use of horizontal loops. Footings rest on scrap rail piles, and pipe is supported in movable bearings on top of pipe posts. Concrete pit in foreground contains trap for discharging condensation. Air vent is provided at top of vertical loop.



BRICK PIERS and cast-in-place concrete lintels are principal structural elements in exterior load-bearing walls, which rest on spread footings.



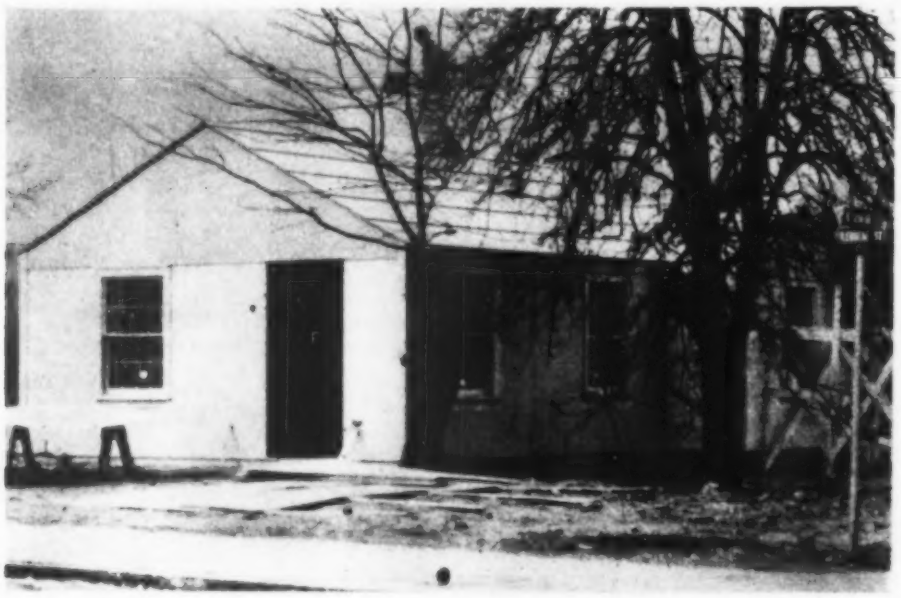
TERRACE AND PERGOLA are attractive outdoor features of low-cost design. Completely equipped 4½-room house sells for $3,300 with 50x200-ft. lot, or $2,900 for house alone.



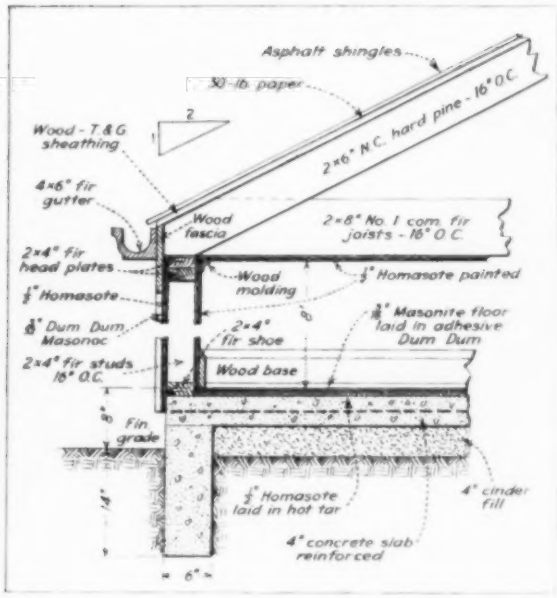
HOUSE FRAMING of Douglas fir means higher first cost for material but saves carpenter labor in erection and avoids later warping which tends to pull nails out of wall board.

Fibre Board Siding

PROTECTED BY SEMI-PLASTIC PAINT INCLOSES LOW-COST HOUSES



THREE CARPENTERS and two negro helpers erect first 4½-room demonstration house in 18 working days. Large sheets of fiber board reduce number of joints and facilitate erection. Window frames and glazed sash are purchased in complete units. Chimney containing small safety flue from gas heater is constructed of fiber board for architectural effect.



TYPICAL WALL SECTION indicates fiber board siding protected by heavy coat of semi-plastic material. Same type of fiber board is used in interior of house for wa ls, ceiling and subfloor.

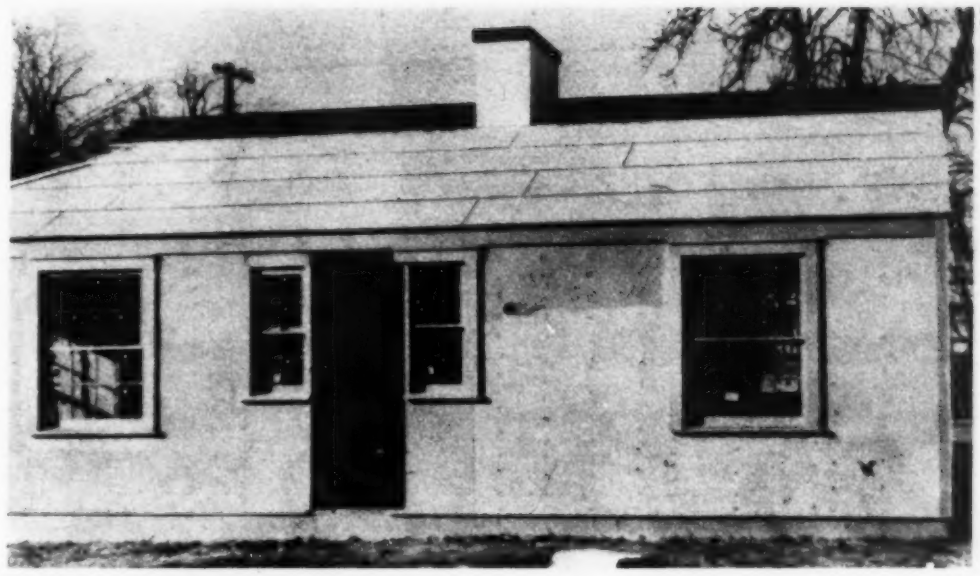
UTILIZING LARGE SHEETS of tough, fiber insulating board on both inside and outside of fir-framed walls, protected on the exterior by a heavy coat of semi-plastic paint compound, the Allied Home Builders Corp., Greensboro, N. C., sponsored by the American Gas Service Co., Pittsburgh, Pa., has built low-cost houses acceptable for FHA mortgage financing in Greensboro, equipping the houses with forced-air gas-heating units and kitchen ranges supplied from 150-gal. tanks which need to be refilled by tank-truck only once a year. A two-bedroom house with a floor area of 768 sq.ft. is sold with a $400 lot, 50x200 ft., for $3,300 or is built on order for $2,900.

Accompanying photographs illustrate construction of the first demonstration house in the downtown section of Greensboro. Seventeen houses have since been built and sold on a 13½-acre plot subdivided into some 40 lots.

Fiber Board — Special interest attaches the use of Homasote fiber board for interior walls and ceilings and for exterior siding, protected in the latter case by a semi-plastic coating which promises to provide a practically permanent, weatherproof coat for the walls. Homasote board was chosen for the house construction because of its durable qualities and its availability in large sheets, up to 8x14 ft., which reduced the number of joints. The large sheets are attached to 2x4-in. studs, 16 in. on centers, by 8-d. nails on 6-in. spacing.

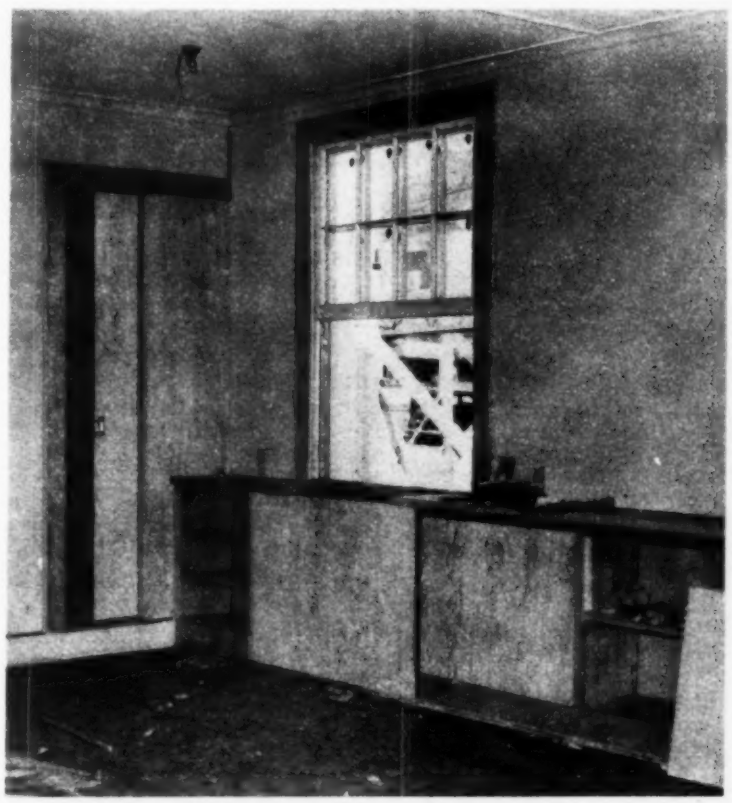
Semi-Plastic Products—Various Dum Dum products of the Arco Co., Cleveland, Ohio, are used to seal the joints

(Continued on page 102)

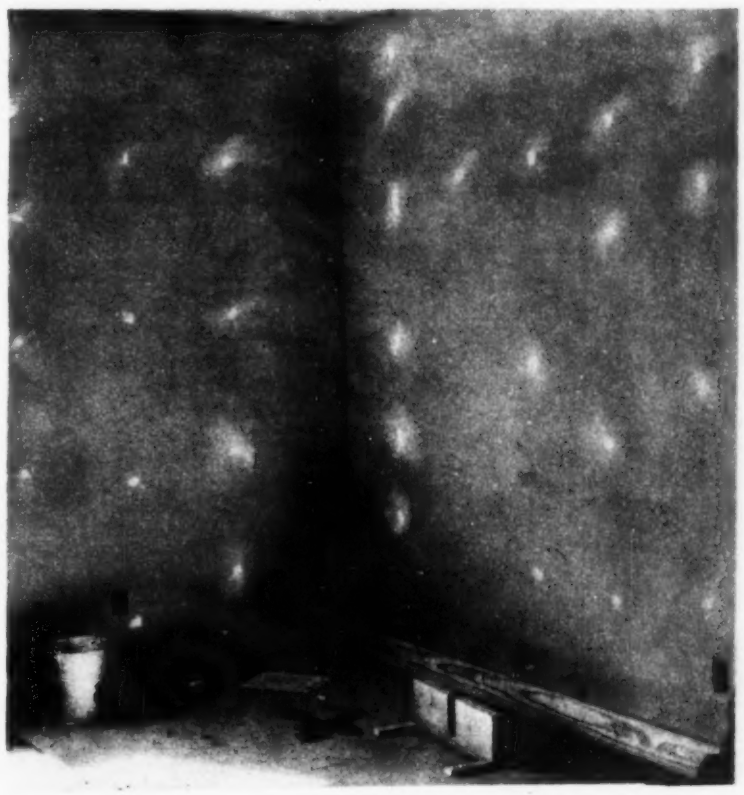


FIBER BOARD SHEETS in sizes up to 8x14 ft. reduce joints to minimum in wall construction. Experimental roof utilizes lapped ¾-in. fiber boards. Nail holes are filled and joints are sealed with semi-plastic compound.

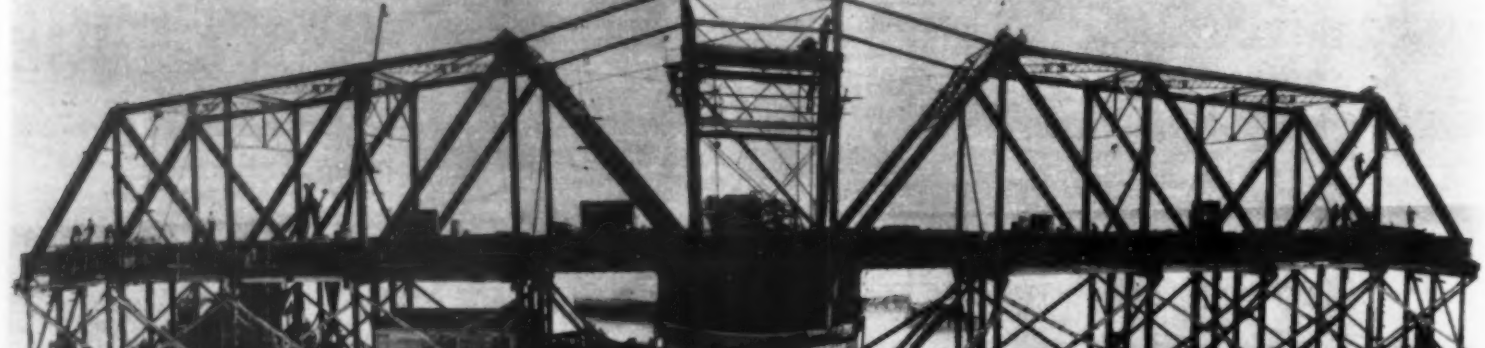
EXTERIOR PROTECTIVE COAT of semi-plastic weatherproof paint is applied 3/32 in. thick to fiber board after priming.



BUILT-IN CONVENIENCES include shelves and closet with sliding door. This alcove off living room serves for dining.



NAIL HOLES in wall board are filled with mixture of plastic material and patching plaster. Fiber board subfloor is laid in hot tar on concrete slab.



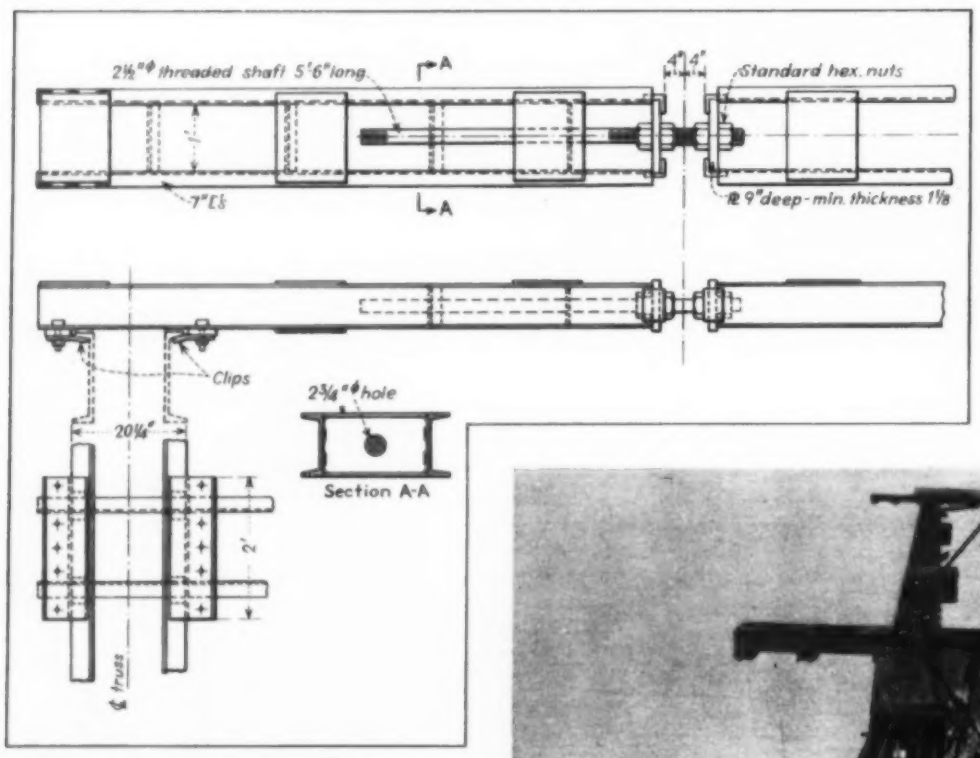
DRAW-SPAN OF BRIDGE across Moser channel is swung into open position and supported by falsework bents prior to widening by shoving trusses apart

DRAW-SPAN WIDENED 8 FEET BY *Jacking Trusses Apart*

PREVIOUS ARTICLES on the construction of Florida's Overseas Highway, extending from the mainland south to Key West, (see issues for July, p. 68 and August, p. 61) have described how existing railway bridges of the concrete arch, steel plate-girder and steel through-truss types were reconstructed to carry a 20-ft. roadway for motor traffic. The following notes explain how a 250-ft. draw-span, which formerly served the Florida East Coast Railway, was widened to accommodate the new vehicular route over the waters of the Gulf of Mexico.

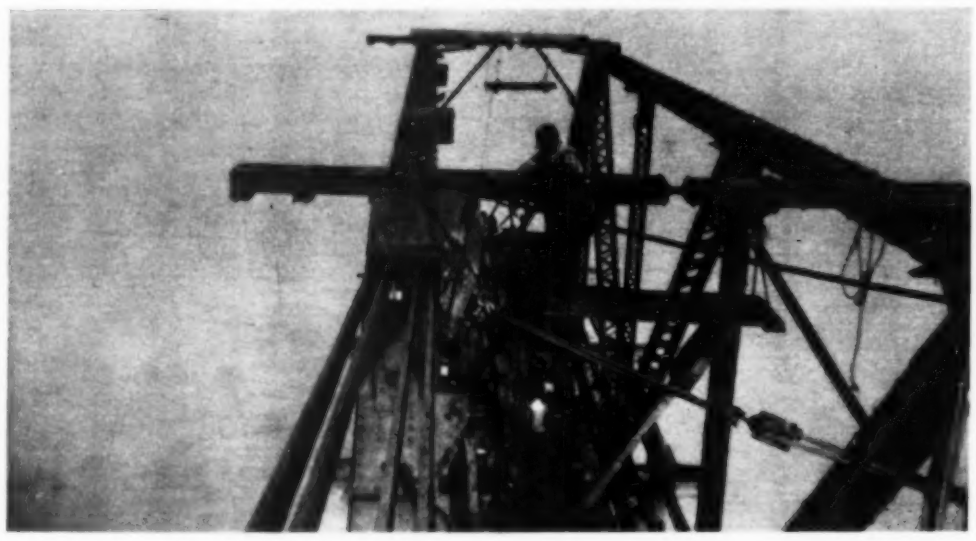
Widening 250-ft. Steel Draw-Span — After receiving bids for widening the 250-ft. Moser Channel steel draw-span 8 ft. to provide for a 20-ft. highway deck, the Overseas Road and Toll Bridge District decided to handle this feature of the project by day labor. Capt. E. H. Sherran, who was employed by the Florida East Coast Railway in the erection of the structure years ago, was placed in charge of the widening operation.

Timber bents first were erected on concrete cutwater walls that had been built when the bridge was erected. One of these bents came under each panel



DETAILS OF ADJUSTABLE STRUT for holding tops of trusses in line during lateral shift.

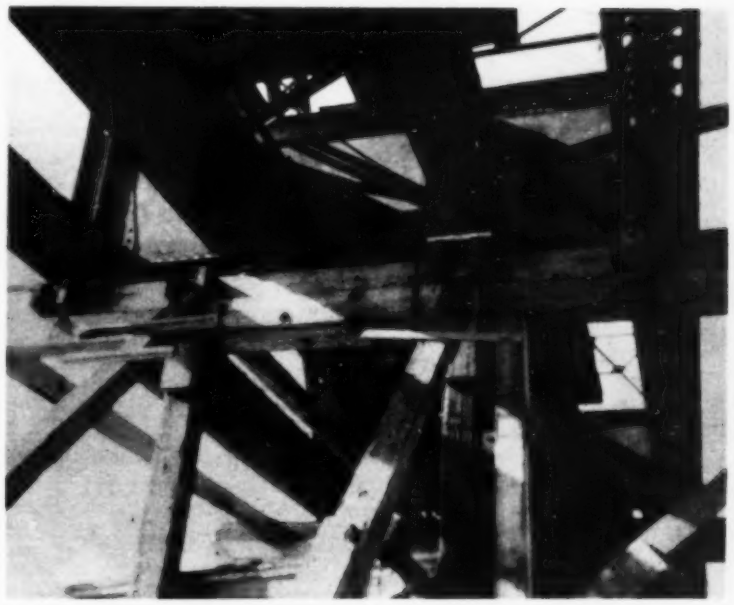
TOP CHORDS OF TRUSSES (below) during lateral shove are held in proper alignment by adjustable strut.



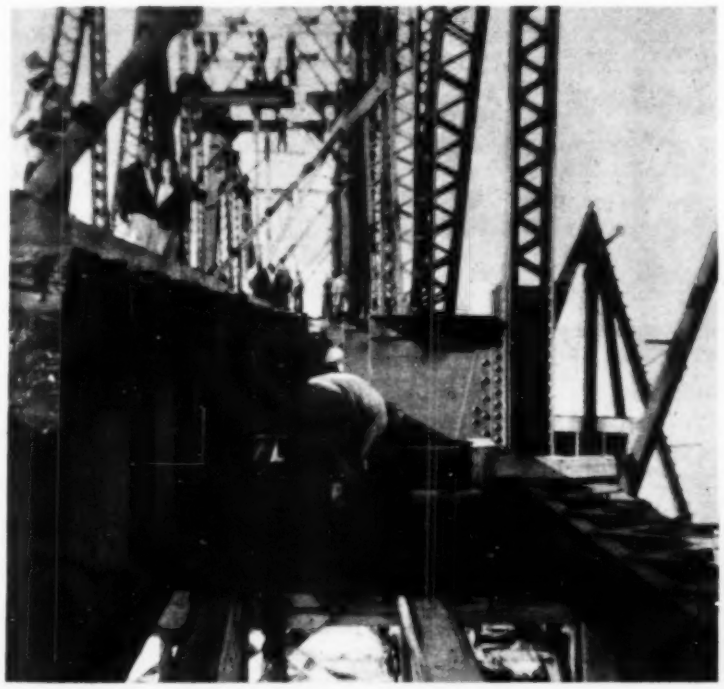
point of the draw when open. These timber bents were amply cross-braced and sway-braced. A steel railroad rail was fastened securely on top of the timber cap of each bent to take the load of the span directly. When the span was later cut in two twice longitudinally these rails provided a smooth surface on which the portions of the span were skidded sideways.

In order to permit the widening of the span the necessary 8 ft. the trusses on one side were moved out 4 ft.; then the trusses on the other side were moved out the same distance. Only the transverse floor girders and the wind and sway bracing in the top of the structure between the trusses on both sides were cut, the trusses being moved intact without any dismantling. Before any cutting of the floor girders or the top bracing was started, a step-by-step program of handling the shifting of the trusses was planned. Since the trusses on each side of the structure had an estimated weight of about 4,150 tons, and it was necessary to keep them absolutely vertical and in line from end to end, complete control had to be maintained from the time they were cut loose until they were again connected.

Movement was obtained by a set of manually-operated screw jacks, one of which was placed at the bottom of each panel point, making fourteen for the span. To prevent the



CAP OF FALSEWORK BENT carrying railroad rail on which truss was skidded



JACKS AT PANEL POINTS are operated by men to shove truss outward 4 ft. after floor beams have been cut.

bottom of the trusses from kicking out as the shifting was in progress, steel cables equipped with steamboat ratchets were fixed around the bottoms of the posts and anchored to the stringers. At each post a cable equipped with a steamboat ratchet also was placed 5 ft. below the top of the 26-ft. post of the truss being moved, with its other end around the bottom of the opposite post in the truss on the other side of the span.

An inclined timber strut was placed a little above the middle of each post, with its lower end against a tie on the main track girder of the bridge. Hawser lines in blocks placed as cross-guys between the end posts of the two half spans provided additional safety against loss of control while the trusses were in motion.

Two specially designed adjustable steel struts to each half of the span, or four in all, held the top of the trusses in line as the shifting was done. Details of these struts are shown in the accompanying drawing. With the shifting jacks, the adjustable struts and the guy cables in place, the main cross girders were cut partly through from end to end of the structure. Simultaneously, the top wind and X-bracing were removed. Then the floor girders were cut entirely through and the shifting started.

With a man at each jack, the latter were all slowly extended the same amount at the same time, on signal. Meanwhile, a man on a boatswain's chair at each of the adjustable struts shifted the four nuts on the 2½-in. threaded shaft in each strut to force the top of the trusses to move out in a vertical plane with the bottom. As the trusses were shifted the steamboat jacks were relieved so as to keep slight tension in the cables across the span. The cables between the posts also were let down gradually as the trusses moved out. At frequent intervals the alignment was checked vertically and horizontally to make sure the trusses moved

(Continued on page 104)

END OF WIDENED SPAN, showing splices of main floor girders.

Present and Accounted For

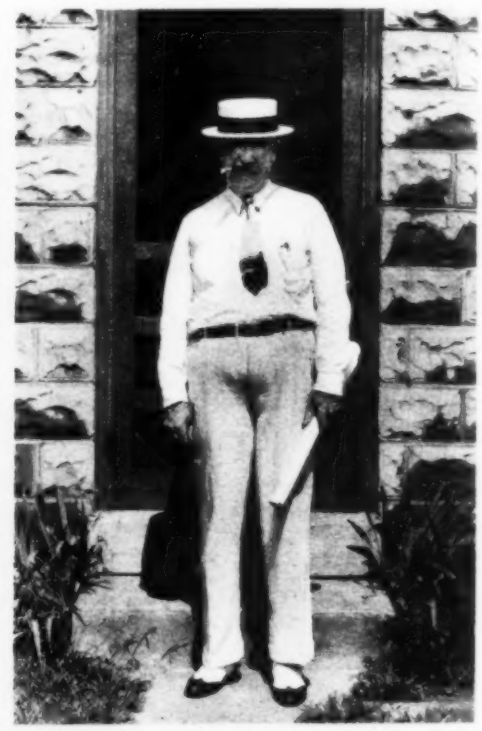
A Page of

PERSONALITIES

AT NARROWS BRIDGE. Tacoma, Washington, group inspecting operations from launch includes (left to right) CHARLES E. ANDREW, consulting engineer, Washington Toll Bridge Authority; JOHN RUMSEY and EVALD ANDERSON, of Rumsey & Co., contractors for the approach to structure.

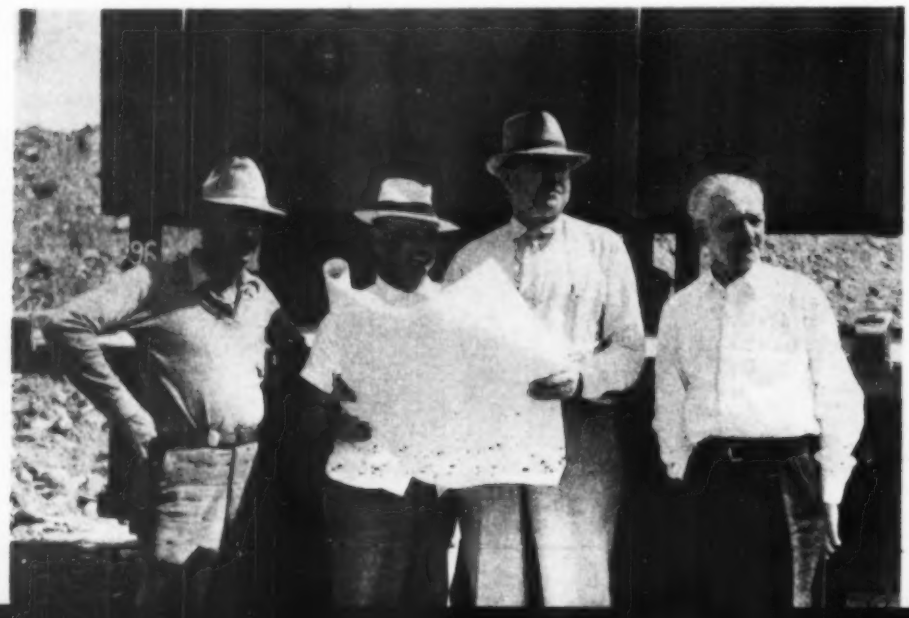
RALPH MYERS, president of Ralph Myers Construction Co., of Salem, Ind., is handling a $2,000,000 flood control project at Kenova and Ceredo, W. Va.

NEW LABOR UNION HEAD. At recent meeting in Atlantic City, N. J., JOHN COYNE was elected president of Building and Construction Trades Department of American Federation of Labor. An agreement was entered into with Associated General Contractors of America to outlaw jurisdictional disputes.



RE-ELECTED PRESIDENT of the Associated Pennsylvania Constructors, is JAMES J. SKELLY, president of James J. Skelly Co., Inc., road building contractor of Media, Pa. The organization has taken a prominent part in promoting the 161-mi. Pennsylvania Turnpike, now under construction between Harrisburg and Pittsburgh.

CONSTRUCTION GROUP (below) at Whitney Point dam, $2,678,000 flood control project in upper New York State, involving 2,250,000 cu yd. of rolled earth fill, includes (left to right) A. B. CABLE, of Cable Bros., Canton, Ohio, sub-contractors; CAPT. W. O. VAN GIESEN, Corps of Engineers, U. S. Army, officer in charge; J. M. SAWYER, general superintendent for Hunkin-Conkey Construction Co. and Shofner, Gordon & Hinman, contractors of Cleveland, Ohio; and F. S. ATKINSON, general contractor's office manager.



CAMERON G. WILL (below). is senior engineer in charge of construction of Ross dam, project of the City Light Department of Seattle, Wash.

Stabilizer Plant FURNISHES CLAY-GRAVEL FOR MICHIGAN SOIL ROAD

STABILIZER PLANT set up near sources of clay and gravel produces 1,000 cu.yd. of correctly proportioned mixture in 10 hr., loading this output by belt conveyor directly into trucks.

USING A CLAY-GRAVEL MIXTURE, proportioned and produced mechanically by a stabilizer plant at a rate of 1,000 cu. yd. per 10-hr. day, the Bartling & Dull Co., Pontiac, Mich., contractor, resurfaced for the State Highway Department a 7½-mi. section of Michigan State Road M-136 at Avoca, northwest of Port Huron. The contract called for 18,800 cu.yd., loose measure, of clay-gravel mixture, placed and compacted on the road at a bid price of $2.15 per cubic yard. Acting under a subcontract agreement, E. P. Brady, Flint, Mich., set up a Pioneer stabilizer plant 3½ mi. from the job at a point where both gravel and clay could be obtained from nearby sources.

Mixing Plant—Materials for the stabilized mixture were trucked short distances from the two sources and were dumped in stockpiles at the mixing plant. A pair of Bay City crawler cranes equipped with ¾-yd. clamshell buckets handled the materials out of the stockpiles into the receiving bins of the stabilizer plant. The plant was a portable unit mounted on pneumatic tires; it could be quickly dismantled for movement to another site.

Operation of the plant was designed to produce correctly proportioned and thoroughly mixed combinations of gravel and binder soil. Gravel and clay were taken away from discharge gates at the bottoms of their separate hoppers by conveyors which were synchronized to deliver materials in the proper proportion to a pug-mill mixer. Sodium chloride in the proportion of 20 lb. per cubic yard was a specified ingredient of the mixture on this contract. It was fed to the clay conveyor from a small hopper operated in conjunction with the clay bin.

A screw conveyor carried clay from the hopper to a belt conveyor which elevated the material to a clay shredder above the pug mill. The shredder consisted of two rotating rolls which operated in contact with each other. Clay dropped from the belt conveyor and passed between the rolls on its way to the pug-mill mixer. The rolls were of different diameters, and the smaller roll was equipped with cutting blades to assist shredding. A tension spring held the large roll in position, permitting it to kick out large stones and save breakage.

A second belt conveyor fed gravel to the pug-mill mixer at the proper rate. During their passage through the pug mill, the materials were wetted by sprays from perforated pipes on the two sides of the mixer bowl, sufficient water being added to hold the moisture content of the mixture at 7 to 8 per cent. The flow of water through these pipes was adjusted by valve control of a small centrifugal pump. Mr. Brady used a metal tank set under the frame of the stabilizer plant as the source of water for the spray bars. A tank truck renewed the supply regularly.

Power to operate the stabilizer plant was furnished by an Allis-Chalmers 110-hp. gasoline engine. A broad belt conveyor, fed by a boot at the discharge end of the pug-mill mixer, elevated the mixed material and loaded it into trucks for hauling to the road. Including the two clamshell-crane operators, and one man handling salt out of a trailer, the entire operating force at the plant comprised seven men. One of these men worked on the ground, assisting clamshell loading.

Material Sources — Graded gravel for the mixture came from a pit and crushing plant situated across the road from the stabilizer plant. William Click & Sons, owners of this plant, dug gravel with a 10-in. suction dredge carrying a cutting ladder and pumped it to the crushing and screening plant through an 8-in. pipe line. Raw gravel was delivered to a 1¼-in. vibrating screen, and oversize material passed from this screen to a jaw crusher. Gravel between 1¼- and ¾-in. size was conveyed from the screen to a roll crusher.

For the stabilized mixture, specifications required that all gravel pass a ¾-in. round screen, with allowable 4 per cent oversize. At the crushing and screening plant, the gravel was graded on ¾-in. square mesh, but the material passed all tests within the allowable 4 per cent oversize.

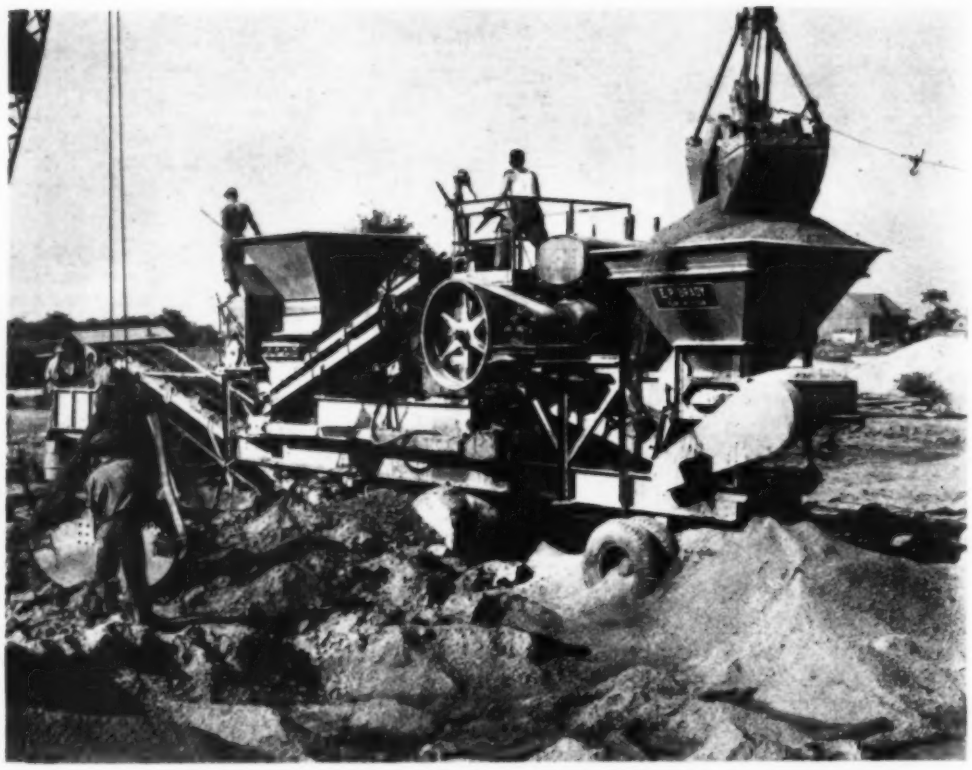
As a source of binder material, the Bartling & Dull Co. opened a pit within 600 ft. of the stabilizer plant location. Soil in this pit, classified as a sandy clay loam, had a normal plasticity index

of 26. The contractor loaded the binder into trucks with an Osgood power shovel.

Stabilized Mixture — Accompanying tables give the grading requirements for gravel and a laboratory mechanical analysis of binder soil. The laboratory analysis of the binder soil sample is typical for most binder soils located in the vicinity of the project. Plasticity index of the binder soil was 16. The stabilized mixture designed for the contract called for the addition of 12 per cent by weight of binder soil having a plastic index of 16. Plasticity index of the finished stabilized mixture averaged about 7.

Existing Road — Preliminary soundings of the existing metal on the old road revealed 3 to 4 in. of traffic-bound gravel extending about 5 ft. on each side of the center line, a total width of 10 ft. The Bartling & Dull contract called for stabilized gravel surface 21 ft. wide of 6-in. compacted depth, including the traffic-bound metal in the center of the road. Thus it was necessary for the contractor to place a full 6-in. compacted thickness of new stabilized material near the edges of the roadway but only 2 to 3 in. in the center.

An original earth excavation item of 9,000 cu.yd. was increased to 43,000 cu.yd. to permit digging out and mixing frost heave areas, as well as the building of better drainage for the road. The exacavation item, for which the contractor bid a unit price of 40c. per cubic yard, included shoulder widening, grade preparation and clean-up. A tractor-drawn LeTourneau 8-yd. carryall scraper moved most of the material. On shoulder finishing, the contractor oper-

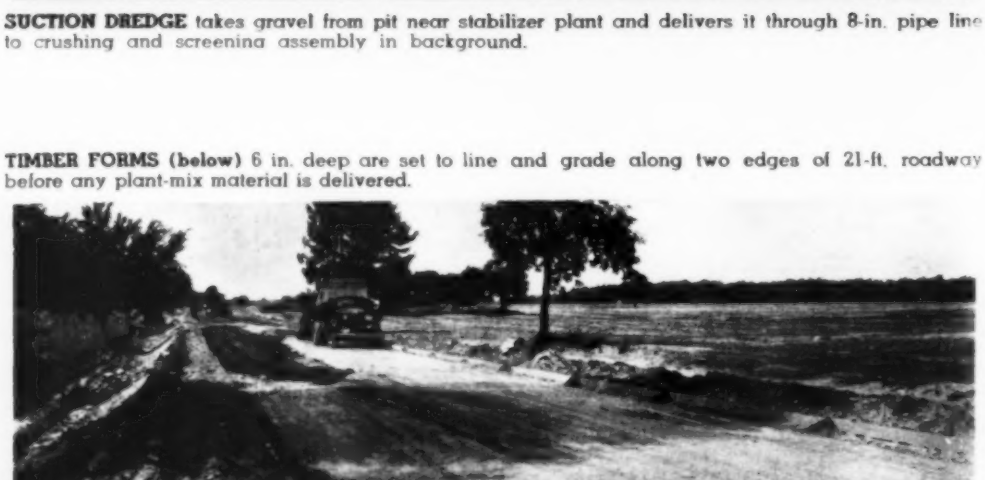


TWO ¾-YD. CLAMSHELLS feed clay and graded gravel from stockpiles to hoppers of stabilizer plant. Under center of chassis is tank for water used to moisten material in pugmill mixer.

STABILIZED MIXTURE is produced under subcontract by E. P. BRADY, who likes to have his handsome setter, Rascal, as a traveling companion.

SUCTION DREDGE takes gravel from pit near stabilizer plant and delivers it through 8-in. pipe line to crushing and screening assembly in background.

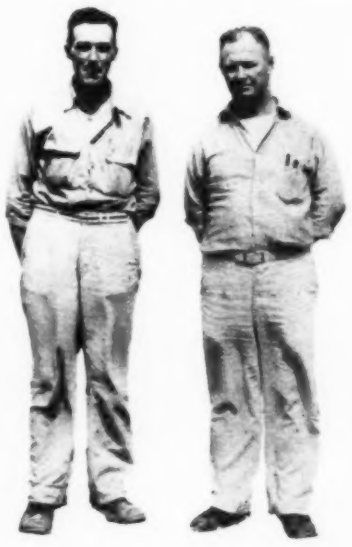
TIMBER FORMS (below) 6 in. deep are set to line and grade along two edges of 21-ft. roadway before any plant-mix material is delivered.



Required Gravel Grading	
Screen or sieve	*Per cent passing, by weight*
¾ in.	100
⅓ in.	60–90
10 mesh	35–50
Per cent passing 10 mesh shall include soil binder.	

Laboratory Mechanical Analysis OF BINDER SOIL SAMPLE	
Gradation	*Per cent by weight*
Fine gravel	2
Coarse sand	1
Medium sand	17
Fine sand	24
Very fine sand	11
Silt	24
Clay	21
Plasticity index	16

DIRECTING PROCEDURE (right) for Michigan Highway Department (left to right): J. P. GREENE, stabilizing plant inspector; M. E. KNUDSTRUP, gravel producing plant inspector; A. S. TAYLOR, project engineer; and J. P. BUCKLEY, statistical engineer.



ROADWAY CONSTRUCTION is supervised for Bartling & Dull Co., contractor, by W. L. EVA (right), superintendent, and HOMER SHINGLEDECKER, foreman on surfacing.

ated a 60-hp. Caterpillar tractor and an Adams 10-ft. blade grader.

Roadway Surfacing — In preparation for placing the stabilized clay-gravel surfacing, a Russell patrol grader, equipped with a scarifier attachment and an 8-ft. blade, scarified and trenched the grade to 21-ft. width, disturbing the existing metal only as much as was necessary to assure bonding with the new material. Edge forms of 2x6-in. timbers were set along both sides of the 21-ft. roadway. The roadway crew used 4,000 lin.ft. of these forms, in 14- and 16-ft. lengths, sufficient for 2,000 lin.ft. of road, to take care of 1,000 cu.yd. of stabilized clay-gravel in an 11½-hr. working day. A second Russell patrol grader maintained the subgrade between the forms and sometimes leveled the first layer of stabilized clay-gravel mixture.

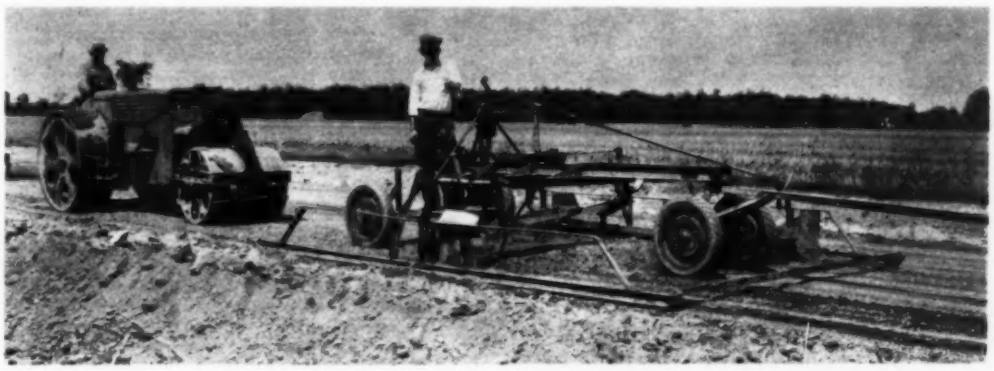
Stabilized material was spread and rolled in two layers which averaged about 4 in. loose and 3 in. compacted. The first layer ordinarily filled the trenched subgrade between the existing

(Continued on page 105)

TAIL-GATE DUMPING of trucks in motion distributes stabilized mixture for spreading to 3- or 4-in. loose depth by patrol graders.

ON FINAL STRIKEOFF of top layer, motor patrol pulls road planer ahead of roller.

ROAD SHAPER (below) drawn by motor patrol planes surface of top layer ahead of 10-ton roller. Planer and roller go over road again after rains.



CONSTRUCTION EQUIPMENT NEWS

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Review of Construction Machinery and Materials for OCTOBER 1939

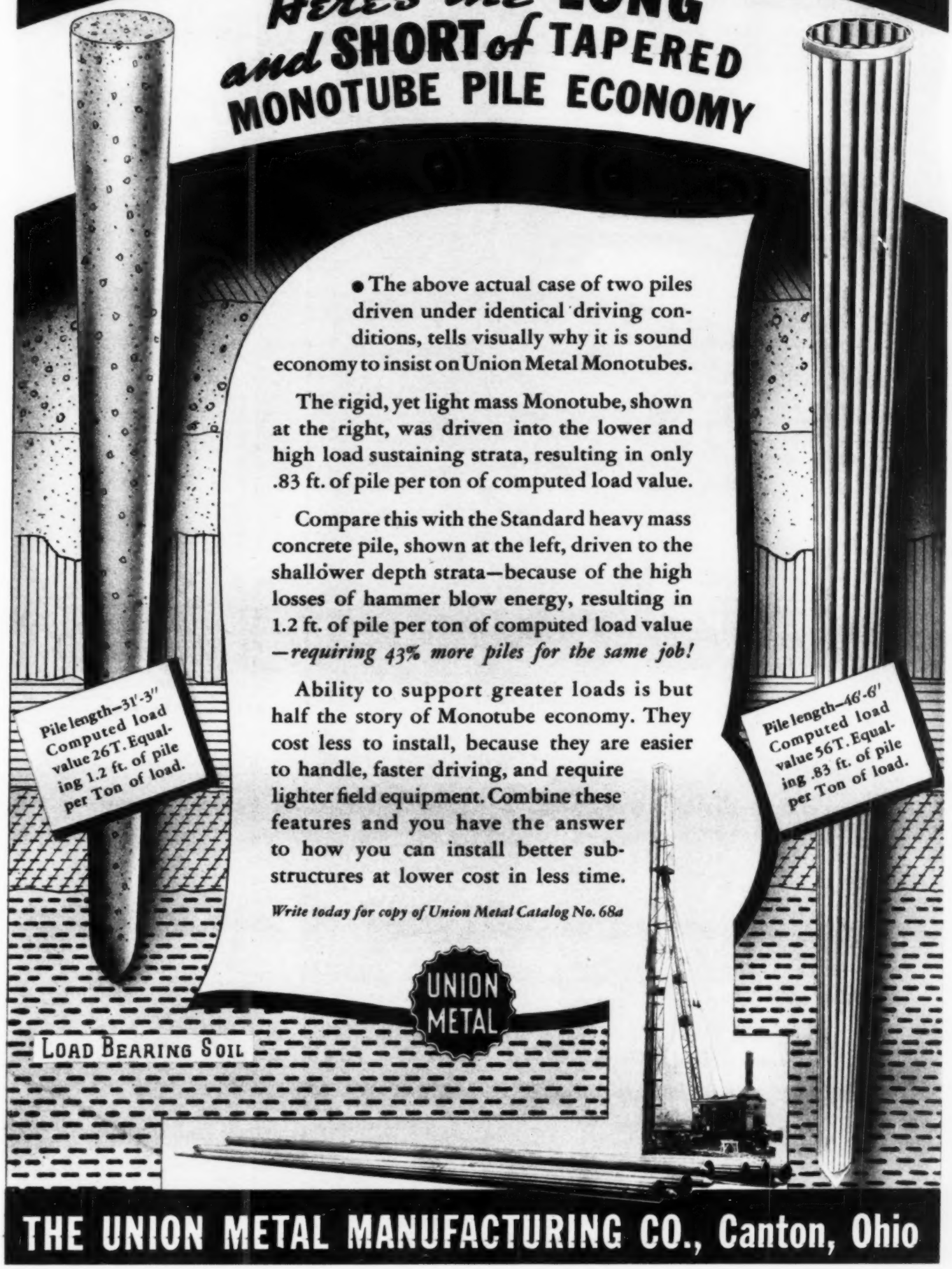
SPRAY SOLUTION for removing excess tar from brick pavements consists of 100 lb. of calcium chloride, 40 gal. of water and 6 lb. of starch. Spraying with this solution prevents tar from sticking to bricks and permits easy removal. Tar is poured at temperatures ranging from 350 to 400 deg. F. and allowed to set. Excess is then removed by scraper and may be re-used. Photo shows application of solution at Cedar Rapids, Iowa, and illustrates ease with which tar can be pealed when calcium chloride solution is applied. Appearance of pavement is also greatly improved, according to Dow technicians. — **The Dow Chemical Co., Midland, Mich.**

CAST IRON FENCE POSTS are now available for use in erection of ornamental guard railings placed along bridge approaches, boulevards and ramps. Impact tests made with 225-lb. weights and tension tests are said to reveal that Meehanite post castings meet required specifications for these uses. Test specimen withstood three blows with 225-lb. weights dropped from 144-in. height. Tension test specimen ½x½ in., from same castings revealed yield point of 41,300 p.s.i. and ultimate strength, 43,500 p.s.i. — **Meehanite Research Institute, 311 Ross St., Pittsburgh, Pa.**

CONVERTIBLE CRAWLER POWER SHOVELS, ½- and ⅜-yd. capacities, have following improvements: Four hook rollers on turntable, roller bearings on major shafts, unit alloy steel casting construction, positive independent cable or chain crowd shovel attachments, increased speeds, scientifically ventilated cabs and ability to swing while traveling. ½-yd. model weighs 30,000 lb., is powered by 50-hp., 6-cylinder motor and has safe crane lifting capacity of 12,500 lb. at 10-ft. radius on 30-ft. boom. ⅜-yd. machine weighs 32,500 lb., has 60-hp., 6-cylinder motor and lifts 13,000 lb. For crane and dragline operation, these models always have travel clutches ready for immediate engagement, said to save time. Trench hoe attachment has 17-ft. boom, 7 ft. 9-in. stick and either bottom or front dump buckets of various cutting widths. Newly designed skeleton trailer available for transporting these machines. — **The Byers Machine Co., Ravenna, Ohio.**

LIGHTWEIGHT, COMPACT MUDJACK (right) one-man operated, for sidewalk, curb and gutter and street work, consists of 34-in. high, 4-cu.ft. capacity hopper for mixed mud and mud pump single piston and rubber ring, inlet valve built in, bore and stroke, 5x6¾ in., 132 cu.in. displacement, 47 cu.ft. per hour, 100 lb. maximum pressure. At lower end of cylinder is attached a 2½-in. rubber nozzle which deposits mud directly to subgrade through holes in slab. Power unit is Briggs & Stratton 4-cycle, single cylinder air-cooled gasoline engine 1¼ hp. at 1,750 r.p.m. V-belt drive to oil tight gear case, all cut gears, bronze bearings, produces 10 strokes of pump per minute. Mud valve, floating ball type, self-cleaning. Mounted on truck with two pneumatic rubber tired disk wheels, 12x3.00 tires, roller bearings. Overall height, 51 in.; width, 25 in.; length, 65 in.; weight, 480 lb. — **Koehring Co., Milwaukee, Wis.**

Here's the LONG *and* SHORT *of* TAPERED MONOTUBE PILE ECONOMY


Pile length—31'-3" Computed load value 26T. Equaling 1.2 ft. of pile per Ton of load.
Pile length—46'-6" Computed load value 56T. Equaling .83 ft. of pile per Ton of load.
UNION METAL
LOAD BEARING SOIL

● The above actual case of two piles driven under identical driving conditions, tells visually why it is sound economy to insist on Union Metal Monotubes.

The rigid, yet light mass Monotube, shown at the right, was driven into the lower and high load sustaining strata, resulting in only .83 ft. of pile per ton of computed load value.

Compare this with the Standard heavy mass concrete pile, shown at the left, driven to the shallower depth strata—because of the high losses of hammer blow energy, resulting in 1.2 ft. of pile per ton of computed load value *—requiring 43% more piles for the same job!*

Ability to support greater loads is but half the story of Monotube economy. They cost less to install, because they are easier to handle, faster driving, and require lighter field equipment. Combine these features and you have the answer to how you can install better substructures at lower cost in less time.

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THE UNION METAL MANUFACTURING CO., Canton, Ohio

Right Down to Fighting Weight!

You want more than dead weight in a bucket to lick a tough digging job. You want speed — agility! Williams design, welded construction, and special alloys insure stamina and ruggedness, without excessive weight. Williams Buckets carry plenty of weight, but they carry it in the right places and in the right proportions. You move more materials in less time with Williams Buckets—and that's profitable. ...and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!

THE WELLMAN ENGINEERING CO.
7017 CENTRAL AVENUE • CLEVELAND, OHIO

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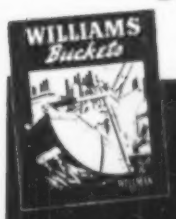

Distributors located in all parts of the country represent the Williams Line of Power-Arm, Multiple Rope, Power-Wheel, Single Line, Hook-On and Dragline Buckets.

WILLIAMS *Buckets*
***built by* WELLMAN**

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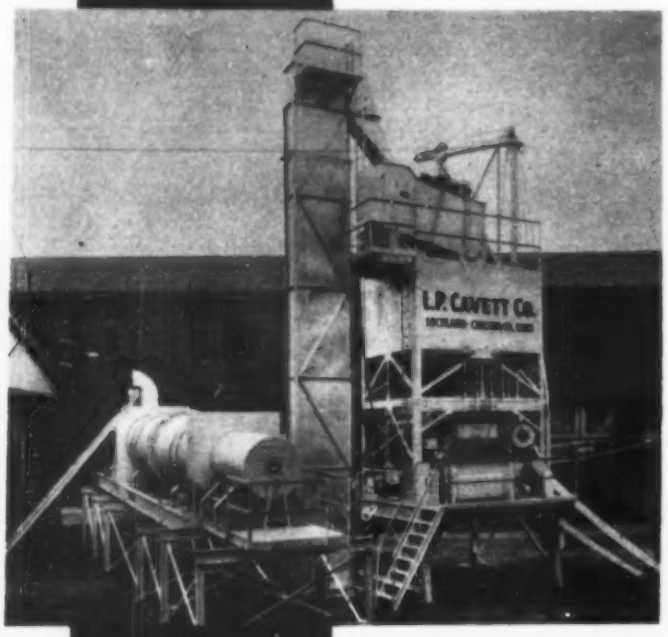

MODEL P-A PLANTS ARE BUILT IN 4 SIZES

MODEL PA-15
1500 ℔ Mixer
MODEL PA-20
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A NEW PORTABLE ASPHALT PLANT

in completely assembled sectional units easily moved by truck or rail and quickly erected without the use of a crane or gin pole.

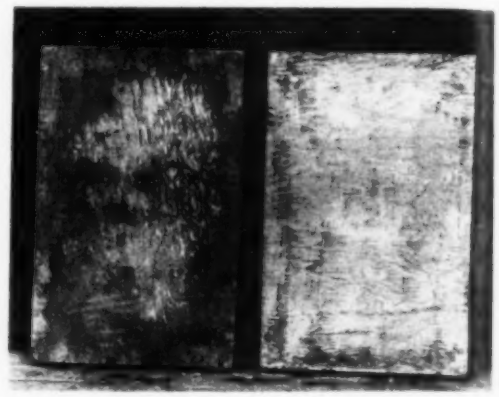
Patents applied for — Built in 4 Sizes

Write for Bulletin T-260

HETHERINGTON & BERNER, INC.

701-745 Kentucky Avenue — Indianapolis, Ind.

NEW LACQUER FOR TREATING PLYWOOD FORMS is claimed to make possible casting of concrete with smoother surfaces than are obtained by oiling forms. Product is same transparent nitrocellulose which is used as base for motion-picture film and has been approved by Portland Cement Association. Thin coating of lacquer seals pores of plywood form, prevents absorption of water from wet concrete, and minimizes formation on sides of forms of



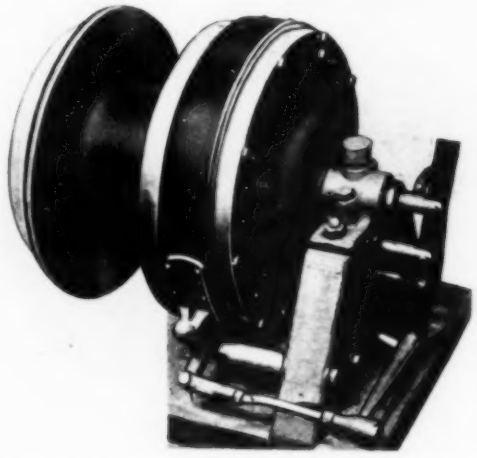
air bubbles which are cause of pitting in finished concrete surface. Lacquer is applied with ordinary calcimine brush to dry wooden form, either before or after assembly of panels. One gallon of lacquer covers 500 sq.ft. of surface. Dries quickly and can be washed off and new coating applied when form is re-used. In accompanying illustration concrete slab at left was cast in oil-treated form and slab at right in lacquer-treated form. — **Eastman Kodak Co., Rochester, N. Y.**

★ ★ ★

THREE NEW FACE SHIELDS, suitable for light duty on operations such as metal hand sawing, sanding, buffing, and light grinding, are said to be compact and light of weight and comfortable to wear under all conditions. May be raised when not in use and friction joint (between shield and head band) holds them in place in either "on" or "off guard" positions. Windows, 4x9 in. in size, made of durable, transparent material, and assure all-around clear vision. Aluminum binding strip gives them rigidity to prevent warping, yet permits shaping to accommodate large features. May be worn with perscription glasses, if necessary, and are available with clear, amber or green windows. Two models equipped with genuine leather sweatband. Headband instantly adjustable for accurate, comfortable fit. — **American Optical Co., Southbridge, Mass.**

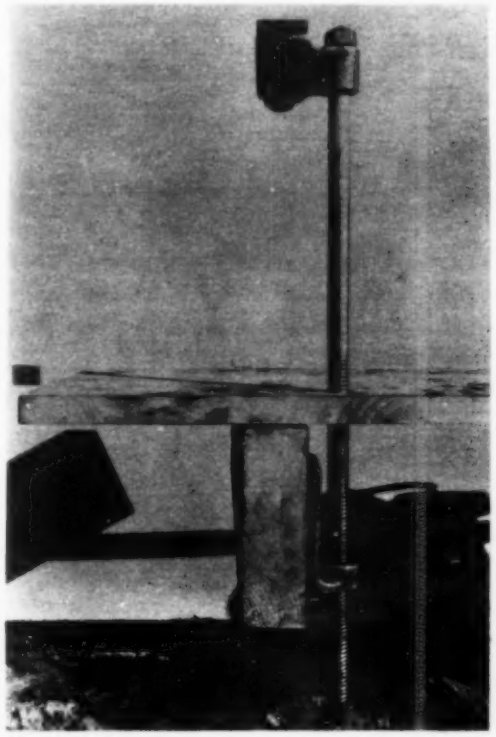
★ ★ ★

HYDRAULICALLY OPERATED CLUTCH, called "Hydra-Clutch," slow speed, heavy-duty unit with recommended maximum speed of 200 r.p.m., for use on bulldozers, carry-all scrapers, winches, hoists and other such machines, has following advantages: (1) Self-energizing — greater load, tighter clutch holds; (2) no clutch plates nor lining; (3) operates entirely on oil; (4) operation said to be



unaffected by climate or by variation in viscosity of oils. Clutch, entirely inclosed, is water and dust proof, will operate submerged in water. Finger tip control; can be operated by electric solanoid for remote control installation. Will perform in vertical or horizontal position. — **Fray-Mershon, Inc., 515 W. Windsor Rd., Glendale, Calif.**

ADJUSTABLE SCREED SUPPORTS said to be easily adjustable and quickly removable, were developed to improve operations of screeding and finishing concrete bridge slabs so that supplementary wearing surfaces might be eliminated and dead loads reduced, thus effecting financial savings on job. As shown in upper photo, support consists of three parts: steel bracket, removable rod and steel arm. Bracket acting as vertical support is firmly secured to joist or other portion of formwork. Into this



bracket is fitted removable threaded rod with nut electrically welded to top. Arm, which is free to revolve on rod, is held between nut and shoulder. It also is slotted a width of 1½ in. to accommodate T-bar supporting screed board, and at bottom has two small slots for wiring of T-bar when it is desirable to spring it to crown or vertical curve. Rod is threaded with pitch of eight to an inch which facilitates setting of T-bars to grade with engineer rod. Ordinary automobile tire wrench (lower photo)

fits nut. T-bars are placed transversely or longitudinally as desired. Maximum size is governed by distance from top of reinforcing steel to top of concrete, and spacing judged by length of screed board. As soon as sufficient amount of concrete has been placed and before screeding operations start grades of T-bars are checked and necessary adjustments made. After screeding, T-bars and supports are removed and finishing operations completed — **Adjustable Screed Co., 10 Meridian St., New London, Conn.**

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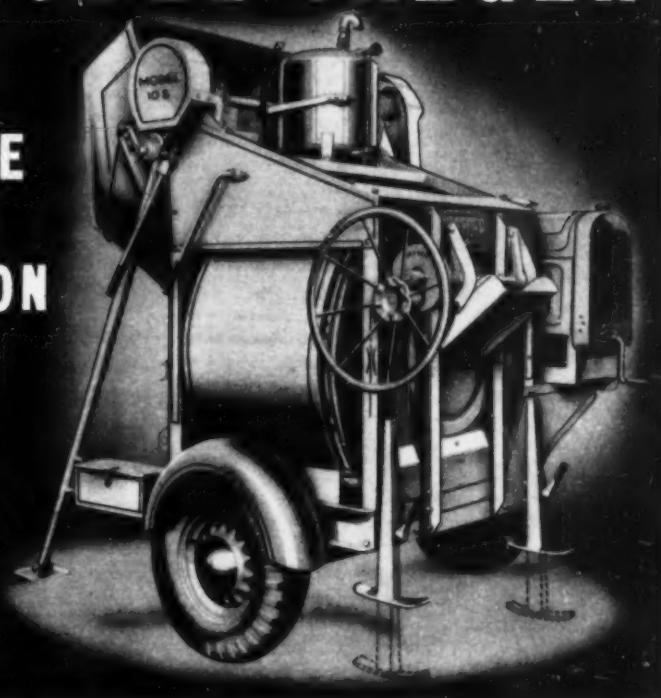
with AUTOMOTIVE TYPE TRANSMISSION and MACHINED STEEL DRUM TRACKS



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3½S End Discharge with Measuring Batch Hopper Mixes 30% to 40% More!

They're light, they're fast, they're portable — yet they'll out-mix and out-last any heavy duty mixer you ever owned.

Gears run in oil, enclosed from dirt and weather — all shafts ball bearing. Machined steel drum tracks, chilled, ground rollers. Send for new Catalog, prices. THE JAEGER MACHINE CO., 800 Dublin Ave., Columbus, Ohio.

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- DEPENDABLE, LONGER LIFE CONSTRUCTION — thousands of EXTRA hours of service.
- EVERY PUMP INDIVIDUALLY TESTED for capacity and pressure before it leaves our factory.

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A Few of the *"Thousand Uses"* for the Simplex UTIL-A-TOOL

Taking up and aligning crawler links so the pin can be readily inserted; clamping and holding booms and structural parts for welding, riveting or assembly and bending or straightening equipment parts such as on bulldozers and snow plows, are only a few of the "thousand uses" for the Simplex Util-A-Tool.

Besides these jobs, it lifts (up to 17½ tons), pushes, pulls, spreads, tensions, cutting costs and saving time for contractors, house movers and highway department shops. Frequently pays for itself on a single job. Comes complete with attachments in handy carrying case.

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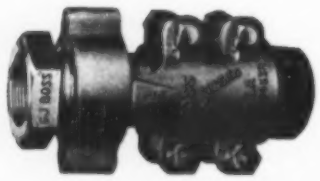

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Maximum safety, long life and important savings in maintenance and replacement costs, are proven advantages of this dependable coupling. A copper insert in spud fits accurately machined rounded head of steel stem, forming a soft-to-hard metal seal that remains *leakproof*, regardless of wear. No washers to wear out or be misplaced, and no possibility of blow-offs. Cadmium plated to prevent rust and corrosion.

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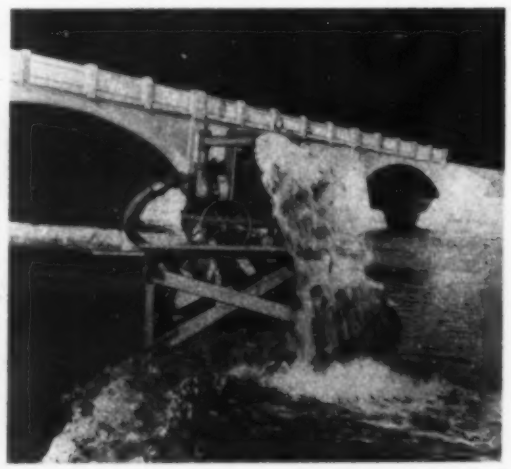

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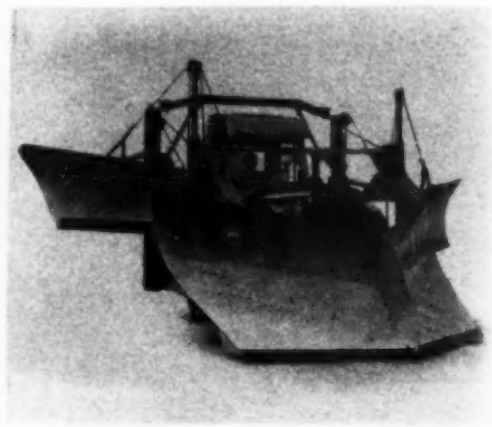
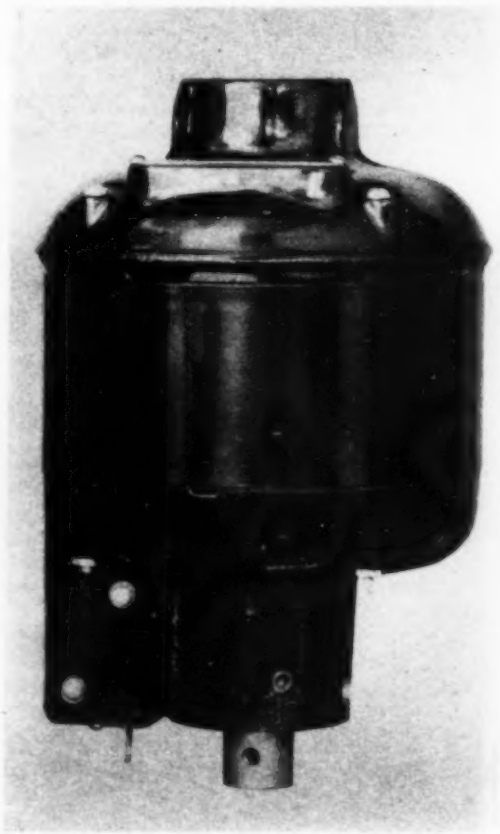
HEAVY-DUTY V-TYPE SNOW PLOW may be made out of Bucyrus-Erie bullgrader or bulldozer by changing only blade and frame. Unit is mounted on International TracTracTor, using same hydraulic pump, hydraulic cylinders, control valve and attaching parts. Convertibility is accomplished by removal of bolts that hold bullgrader and bulldozer frame and blade in place. Lifting rods then are disconnected, unit is backed out and tractor is run into snow plow frame and bolted. Hydraulically controlled plow has speeds up to 6 m.p.h. for light



snows and with plow and wings at ground level clears path as wide as 18 ft. In heavier snows or on wide roads, one wing can be raised and used to swing snow back to ditch while other wing stays at ground level for extra plowing width. Wings have 6-ft. ground clearance, easily clearing mail boxes and fence posts. For heavy drifts, plow clears 9-ft. strip and may be used without wings. Winter cab has windows on all four sides insuring full visibility and proper ventilation. — **Bucyrus-Erie Co., South Milwaukee, Wis.**

★ ★ ★

SUMP-PUMP MOTOR, special resistance, split phase unit, is protected from falling dirt and moisture which might cause injury to windings or rotating parts by dripproof top end shield to prevent entrance of water. Motor rated at ¼ hp., 1,725 r.p.m.,



110-v., 60-cycles. Low pressure, single-pole toggle switch built inside motor is completely connected in motor circuit. Eight-foot cord and plug set supplied with motor for convenient connections to power supply. — **General Electric Co., Schenectady, N. Y.**

...THAT SHEAVE HAS CHEWED UP ITS LAST WIRE ROPE!

FROM THE DAILY REPORT OF A TIGER BRAND WIRE ROPE ENGINEER

No sooner stepped in here this morning when the super had me by the arm. "Come with me," he said, "I want to show you something."

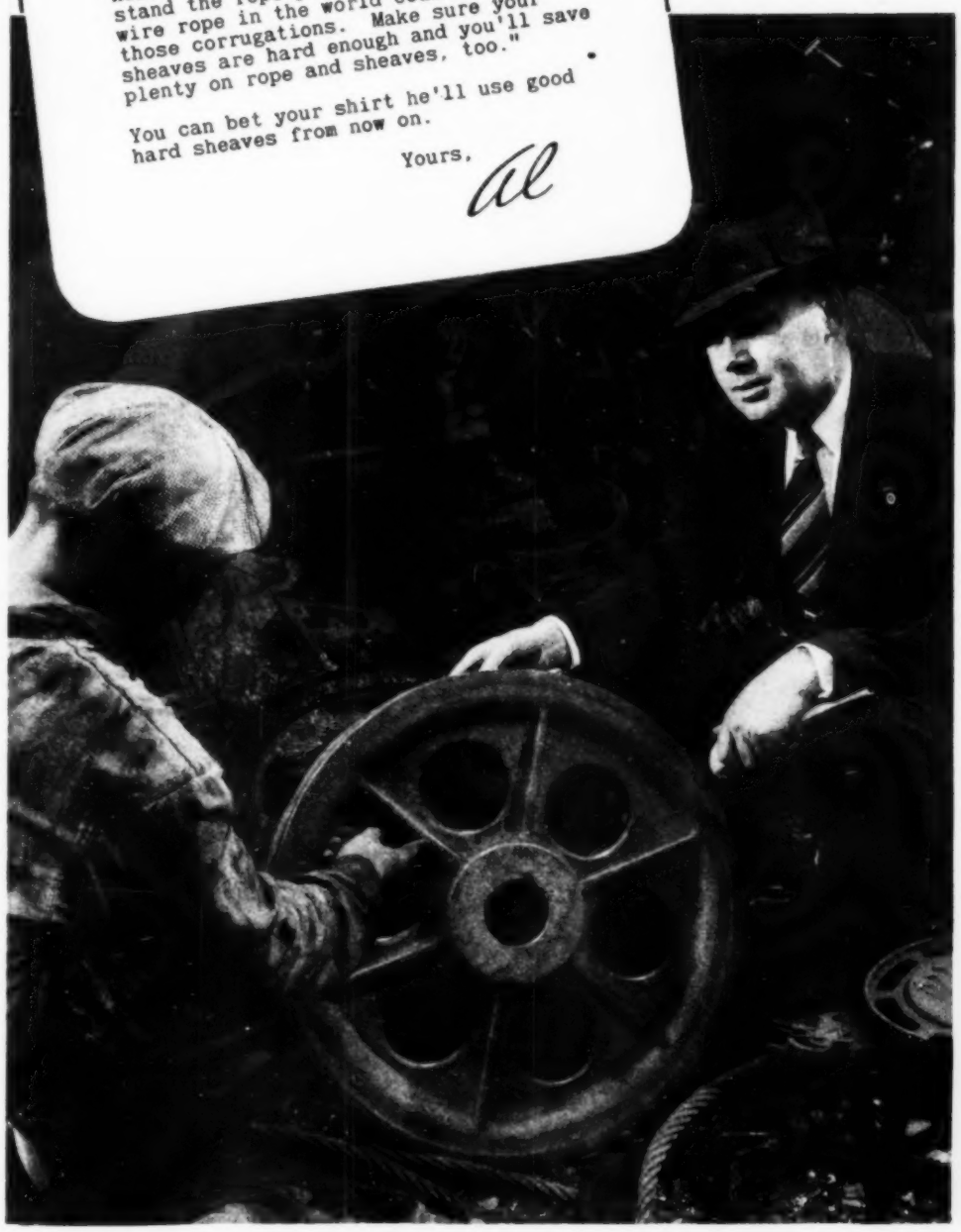
At the scrap pile he pointed at a discarded sheave. "There's a sheave that has chewed up its last wire rope," he said. "Only a few months old but it's already ruined two ropes."

I could see it was badly corrugated. "The trouble with that sheave," I told him, "is that it wasn't hard enough to stand the rope pressure. Why, the best wire rope in the world couldn't last on those corrugations. Make sure your sheaves are hard enough and you'll save plenty on rope and sheaves, too."

You can bet your shirt he'll use good hard sheaves from now on.

Yours,

al



THE material from which a sheave is made should be hard enough to withstand the wear caused by the pressure of the rope on the sheave groove. Sheaves made from too soft material not only wear rapidly, but also shorten the rope life, because the deepened grooves do not provide working clearances for the rope. The resultant pinching of the rope imposes a binding action which prevents proper load distribution, and causes excessive internal and external friction. Corrugations from strand and wire impressions further reduce rope life by accelerating wear.

Limiting values of the pressure between a rope and sheave to secure satisfactory service have been established for all common materials from which sheaves are manufactured. If you are encountering undue sheave wear, our Engineering Department will gladly help you determine the pressure on your sheaves and make money-saving recommendations based on these standards.

USS

EXCELLAY *Preformed* **WIRE ROPE**

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Cleveland, Chicago and New York

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UNITED STATES STEEL

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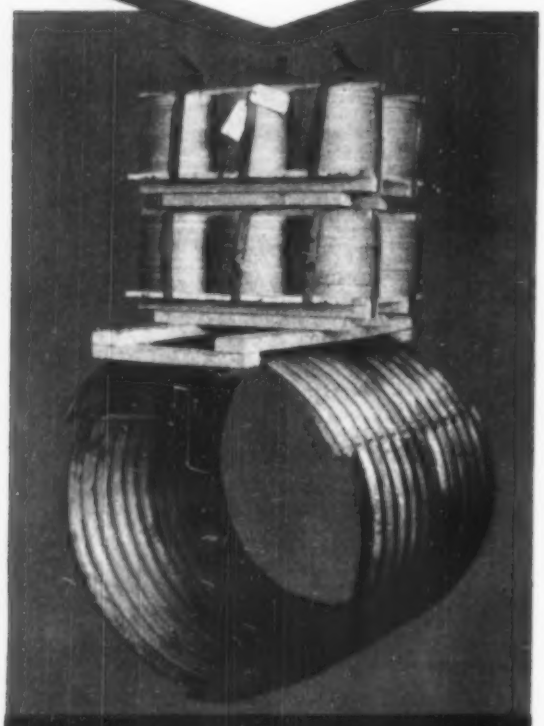
Use Heavy Liner
FOR SMALL TUNNELS?



Without side support this 30° section of 12' diameter 14-gage ARMCO Light-Duty Tunnel-Liner easily carried a 4010-lb. concentrated load.

• With ARMCO Light-Duty Plates you can line small diameter tunnels faster and at lower cost than ever before.

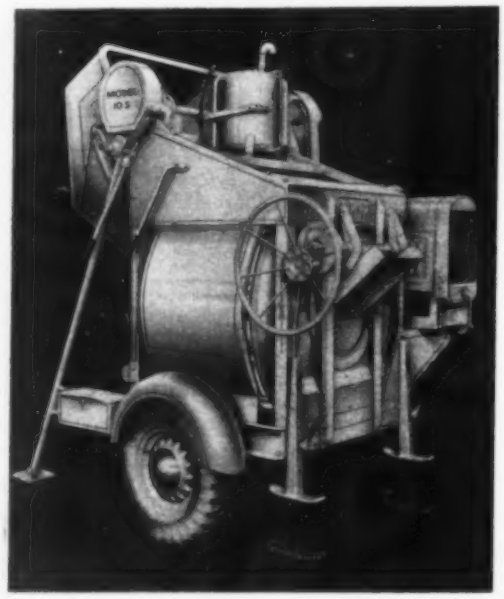
Here's the reason. These sturdy metal plates are especially designed for light-duty service. Because they combine ample strength with light weight, they naturally cost less than heavy, bulky materials. And less weight makes ARMCO Light-Duty Plates easier to handle and install.

Let us show you how ARMCO Light-Duty Plates will speed construction and cut costs on your next small diameter tunnel job. Just address your inquiry to The American Rolling Mill Company, 361 Curtis Street, Middletown, Ohio.

ARMCO

LIGHT-DUTY TUNNEL LINER

CONCRETE MIXER, combining heavy-duty service and light, portable end discharge trailer design has automotive type transmission consisting of machined, heat-treated alloy steel gears and heavy-duty ball bearings, fully inclosed from dirt or weather and running in oil. This transmission is said to increase power efficiency from 30 to 40 per cent, to prolong mixer life and to eliminate most of usual mechanical noises. Shaft load is divided. One set of gears drives drum through short chain to ball bearing drum pinion shaft. Another set provides right angle drive through chain to ball bearing skip hoist overhead. Semi-steel sprockets and one-



piece drum gear. Drums equipped with machined high carbon steel tracks, and carried on chilled, ground-face car-wheel rollers. Pneumatic tires, Timken bearing wheels, spring shock absorbers. Two- or four-wheel mountings interchangeable, with improved adjustable supports to take load off tires while mixers are working. Weight of loading end is supported from top frame by two full-length adjustable supports. When mixing adjustable feet are lowered to remove weight from tires. Available in all sizes, from 5s to 14s.—**Jaeger Machine Co., Columbus, Ohio.**

★ ★ ★

PORTABLE PNEUMATIC GRINDER for small wheel work is 5½ in. long and weighs 18 oz. Small size and light weight make this tool easy to handle especially for delicate precision operations. Runs at free speed of 1,800 r.p.m. Mounted abrasive wheels in all shapes and sizes from smallest pointed wheel up to 1½-in.-diameter round wheels can be used efficiently as well as rotary files, steel cutters, sanding disks wire brushes, saw blades and buffing and polishing wheels. Other advantages claimed: (1) Power for continuous service on hard

est jobs; (2) holds nearly constant speed under load with virtually no power waste; (3) low air consumption assures low operating cost; (4) simplified design reduces wear, resulting in low maintenance cost. Standard equipment includes push-button throttle that may be locked for continuous operations, ¼-in. collet and swivel hose connection. Lever throttle may be had instead of pushbutton, if desired, and adaptor for collet can be replaced by adaptor with chuck.—**Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.**

6 handy, pocket-size volumes on every phase of building construction and management

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- keeping records and accounts
- gauging unit costs
- selling your services

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C.M. 10-39

REPAIR CLAMP for quickly stopping leaks in threads of screw collars may be had in sizes from 4½ to 12 in., inclusive. Smaller clamp of same design, but with malleable followers instead of steel, comes in sizes ¾ to 4 in. inclusive. According to

makers, collar clamp consists of few simple factory-made parts (followers, gaskets, bolts) quickly assembled with wrench. Advantages claimed simplicity, speed, efficiency and permanent tightness. Unskilled labor can easily apply clamp without

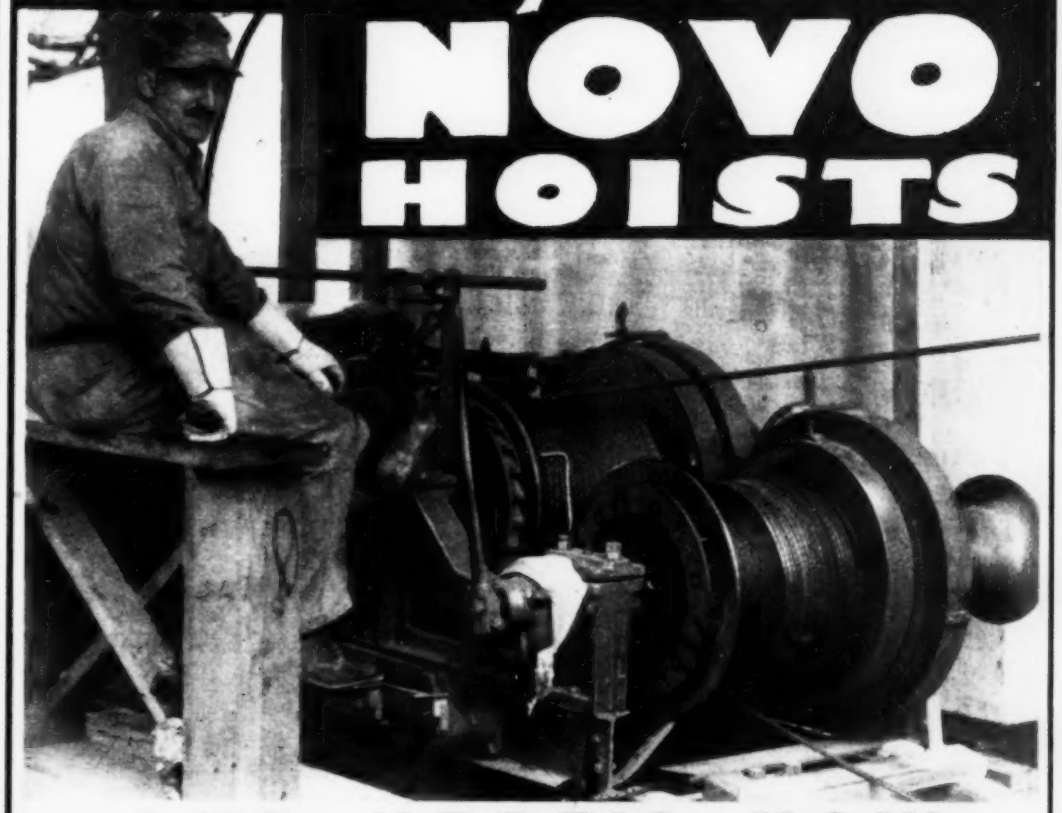
interruption of service. Clamp may be furnished for any collar, old or new. Upper photo shows leaking screw collar and lower one shows leak permanently stopped by installation of collar clamp, applied in few seconds while line is under pressure. — **Dresser Mfg. Co., Bradford, Pa.**

★ ★ ★

AIR HOSE for use in mining operations and hot oil conditions is high grade synthetic rubber tube and tan gum cover both bonded to hose body by exclusive method, said to produce excellent adhesion. Body, of cord tire construction, is provided with

ample pressure resistance, and although more flexible and lighter than before, is said to be many times stronger than necessary for actual working conditions. — **United States Rubber Products Inc., Mechanical Goods Division, 1790 Broadway, New York City.**

Get the right lift with NOVO HOISTS



AND HERE'S HOW

SMOOTH ACTION —Novo double cone friction blocks take hold smoothly with a sure, quick action. The double area gives greater efficiency.

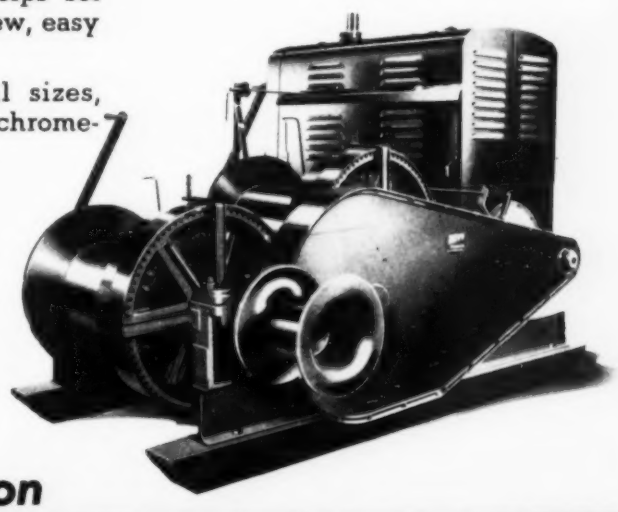
FEATHER TOUCH CONTROL — The Novo Screw Thrust puts a higher leverage behind the shifter rod Screw assembly runs in oil.

SELF ENERGIZING BRAKES — The drop of the load helps set the brakes, resulting in new, easy control.

QUALITY HOISTS— All sizes, small to heavy duty, have chrome-nickel alloy construction, welded steel base, countersunk bearing caps. Silent chain drive above 30 H. P.

SILENT CHAIN DRIVE—Efficient transmission of power by high-speed, multiple roller chain cuts operating cost and gives quieter operation. Standard on all Novo Hoists above 30 H. P.

Gasoline, Electric or Diesel Power.
SEND FOR LITERATURE
2 to 65 H.P.



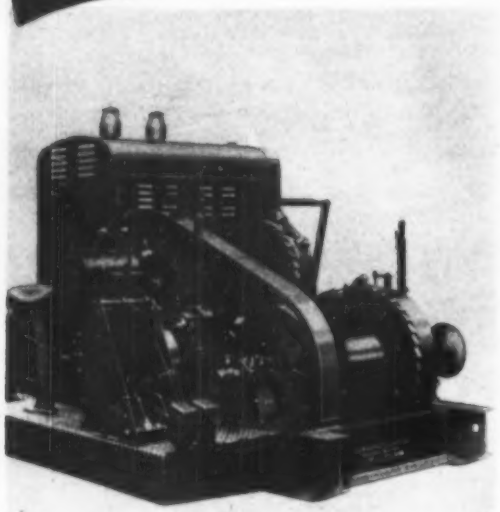
Novo Double Drum heavy-duty Hoist with silent chain drive and six cylinder gasoline power unit.

Send the Coupon

NOVO ENGINE COMPANY
LANSING, MICHIGAN

NOVO ENGINE COMPANY, 214 Porter St., Lansing, Mich.
Send me complete information on Novo Hoists (size).....
Name.....
Address..... City..... State.....

AMERICAN
TWO SPEED
STEEL ERECTION
HOISTS



With AMERICAN Air-Controlled Contracting Band Frictions and the very last word in ultra-modern hoist design and construction all the way through. These great Hoists were planned and built to give one hundred per cent service on present day "High Pressure" jobs, where rising costs must be countered with more speed, more power, greater ease and flexibility of operation, and the ruggedness which insures continued prosecution of the work. Positive protection against dropped loads due to operator or power failure. Line pulls and speeds to fit all job requirements.

Out of our fifty-five years experience we offer the Hoist of Tomorrow to the Contractors of Today.

Write today for Catalog 100-H-3.

The Genuine CROSBY CLIP

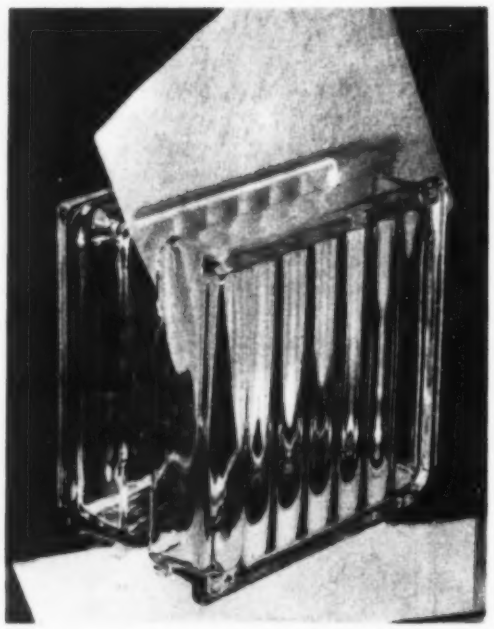
AMERICAN HOIST & DERRICK CO.

NEW YORK ST. PAUL CHICAGO

AMERICAN TERRY DERRICK COMPANY

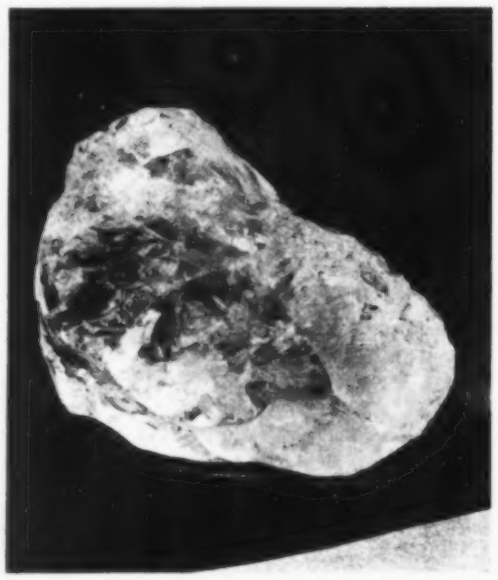
SOUTH KEARNY, N. J.

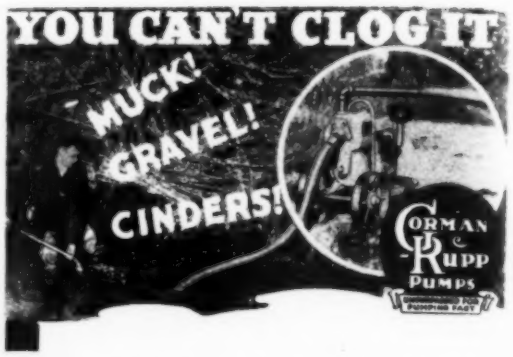
GLASS BUILDING BLOCK. said to give soft, diffused light that reduces glare of sun and to decrease transmission of solar energy, cutting down cooling load in air-conditioned rooms, is made by fusing at high temperature, two pressed, square glass cups into all-glass welded unit. Between block halves is sealed glass fiber sheet, forming integral part of finished unit in center of block. High sealing temperature results in formation of partial vacuum in block interior when it cools, thus increasing insulating value of unit. Variations in effects desired in using these blocks may be had by changing thickness of "fiberglas" sheet. For use in large wall areas where it is desirable to diffuse excessive sunlight. — **Pittsburgh Plate Glass Co., Pittsburgh, Pa.**



★ ★ ★

NEW TYPE TRACING PAPER. named Albanene, said to combine transparency of oil treated sheets with permanence of natural 100 per cent rag papers. Made of long fiber clean white rags treated with crystal clear synthetic solid called Albanite (crystal shown in photo) which is free from oil and wax and chemically and physically inert and therefore, according to manufacturers' claims, will not oxidize, turn yellow, become brittle or lose transparency with age. New chemical said to have remarkable penetrating power permitting use of extremely long fiber base paper, assuring for Albanene an unusually high strength factor by all standard paper tests. Paper treated with this agent produces fine toothed, smooth drawing surface which takes strong pencil lines with minimum wear on point. All lines held by fine hard tooth and do not become embedded in paper structure, permitting easy correction and erasure. Offered in three weights, light, medium and heavy — **Keuffel & Esser Co., Hoboken, N. J.**





"Old Faithful" that's what construction and maintenance men everywhere call their G & R self-priming centrifugal pumps. Fool proof because they're gadget-less. They've got something the others haven't—simplicity. They can't clog—they're not quitters.

The only pumps with renewable wearing plate — they're modern.

G & R's will deliver more water per hour and pump more hours at less cost — under any conditions.

WE WILL SHIP YOU ONE
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THE MOST DEPENDABLE PUMPS FOR THE LEAST MONEY
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The result of 30 years' experience. They'll easily drive modern heavier, longer piles. One-piece frames, no bolts to work loose. Few parts are of highest quality, heat-treated alloy steel. Central point lubrication. Complete line of sizes. Steam or compressed air operation, without changing parts.

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If a Rope of Gold would cost you less ***we'd recommend it***

The price-per-foot of wire rope means little to the rope user. It's the price-per-unit-of-use that determines the actual cost of wire rope. If a rope made of gold would show lower use costs, it would be a real economical selection. Real economy for the user is the basis of all recommendations by Wickwire for both Regular Lay and Wisscolay Preformed Wire Ropes. While the purchase price of Wickwire Rope is no higher than that of other recognized brands, users who change to Wickwire Rope usually find that their price-per-unit-of-use goes down. Wickwire Rope lives longer . . . use it yourself and note the difference.

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HIKE PROFITS ON THOSE

Large Tunnel Jobs

There is an ARMCO Liner Plate for virtually every size and shape of tunnel. This horseshoe design serves as an intercepting sewer for a large eastern city.

You no longer need heavy, bulky liner for large diameter tunnels. ARMCO Structural Steel Plate Lining will do the job and save you time and money.

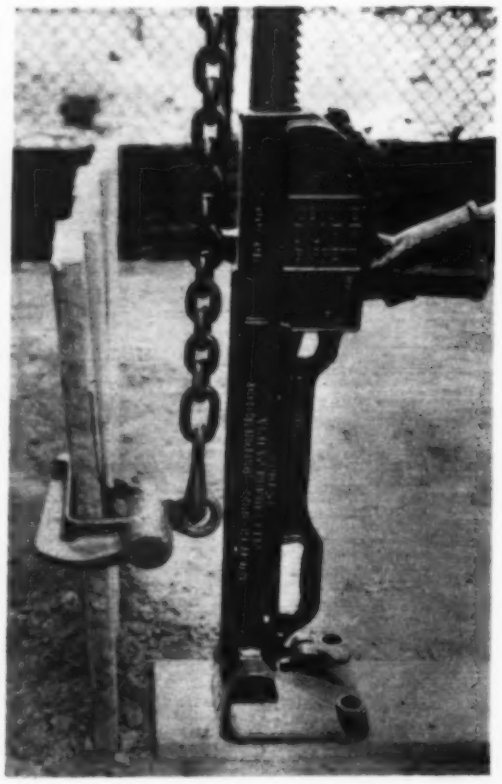
On a strength-weight basis ARMCO plates cost less than any four-flange type. The corrugated and flanged design carries the load and eliminates excess weight. Installation moves right along. One man can easily handle the sectional metal plates and a structural wrench is the only tool needed for assembly. Also important, there is no fire hazard when working in compressed air.

Make a full profit on that next tunnel job with ARMCO Liner Plates. You have a choice of gages in standard plate for large tunnels or light-duty plate for small diameter jobs. Write today for prices and complete information. The American Rolling Mill Co., 1821 Curtis St., Middletown, O.

ARMCO

ARMCO TUNNEL LINER PLATES

PILING PULLER for speeding up removal of deeply embedded wooden piling or shoring. Used in connection with lifting jack or crane, device is said to take bite from 1 to 2½ in., literally lifting piling out



by roots. Photograph shows piling puller set in place with Duff-Norton pole jack doing lifting. At a few strokes on lever bar, puller bites in, chain becomes taut and up comes planking. — **The Duff-Norton Mfg. Co., Pittsburgh, Pa.**

★ ★ ★

RESIN CEMENT called Korez and impervious to most acids, to oils, water and mild alkalies, is applied as mortar which quickly sets by chemical action at room temperature to dense, strong jointing material. Used as acid tight jointing material for acid proof brick, this product is said to solve corrosion and maintenance problems in construction of acid pickling tanks, acid neutralization and disposal equipment in steel and allied industries. Valuable also as lining equipment for recrystallization of salt solutions. Said not to be affected by abrasion or turbulent liquids. — **The Atlas Mineral Products Co., Mertztown, Pa.**

★ ★ ★

HIGH SPEED HOLE SAWS for use in ½ in., or larger, electric drills to increase capacity for cutting clean, round holes in any material hack saw will cut. Adaptable to many uses such as attaching hot water heaters to boilers, running new pipe lines or electrical conduit through floors and walls, installing

oil burners in furnaces and setting new dials in instrument panels. Of particular interest is new mandrel for ¼- and ⅜-in. drills which can be used to drive hole saws up to 1½ in. in diameter. — **Black & Decker Mfg. Co., Towson, Md.**

NEW-TYPE VENTILATOR called "Winco" for use in homes or offices with glass block walls is made of stainless steel which is said never to need painting. Available in five different shapes and can be installed in any standard size glass blocks. Soap and water will remove spots or smudges from stainless steel. Said to provide ventilation without draughts. Can easily be adjusted to any position and opened during heavy rains. Burglar proof.—**Winco Ventilator Co., St. Louis, Mo.**

★ ★ ★

NEW TYPE OF HAULAGE UNIT, convertible to track or wheel operation by throwing control lever mounted within reach of driver, has been developed for road building and maintenance, for snow plowing, for oil field haulage, coal mining, logging and other haulage jobs which now require auxiliary equipment or rehandling of loads. Top photo shows new machine operating on dual pneumatic-tired wheels with 7 in. of road clearance under traction unit. In this position drive is on front wheels, traction unit idling and merely revolving should it hit obstruction. Load distribution is 50/50 on front and rear wheels with maximum speed of

35 m.p.h. When track operation is desired, operator pushes control lever and rear wheels are raised hydraulically to allow 9 in. of road clearance, if desired, or they can be allowed to trail. When truck is operating on tracks, load distribution is 75 per cent on tracks and 25 per cent on front wheels, with drive on tracks and front wheels simultaneously. Maximum speed, loaded, on tracks, 12 m.p.h. Bottom photo shows jackknife lever unit which raises and lowers rear wheels. Body capacity, 5 tons; chassis weight, with cab, 11,500 lb. Engine

6-cylinder Hercules, 105 b.h.p. at 2,400 r.p.m. Gasoline or diesel power optional. Standard equipment: four-wheel hydraulic brakes; parking brake; electric lights and starter; tail and stop light, shock absorbers; windshield wiper; two tow eyes in front and rear drawhead; complete tool kit. — **Linn Mfg. Co., Morris, N. Y.**

Bucyrus-Erie Scrapers are *Easy Loading*

Bucyrus-Erie Scrapers load the last yard of dirt as easily as they do the first yard. Their double curve cutting edge causes dirt to "boil up" and fall evenly into *both* apron and bowl. No need to push back or raise up dirt already in the scraper. Even dirt at the top of the load comes in easily, direct from the cutting edge.

That's why Bucyrus-Erie Scrapers load in fewer lineal feet than other scrapers. It also accounts for the crowned heap on the loads. These scrapers not only load full — they also load fast and produce more payloads per day.

Get all the facts on these easy loading scrapers from your nearest International Harvester TracTracTor Dealer.

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Get RID of that $ $ WASTER *Water!*

Sewage Disposal Plant — Bagley, Minnesota

A Moretrench Wellpoint System will dry up your work — in short order and at low cost. Don't start a wet job without it!

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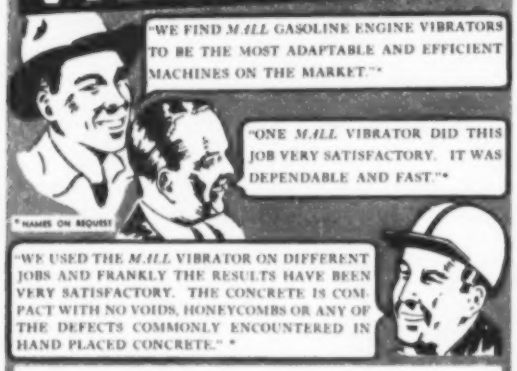
What Users Say about Mall VIBRATORS


"WE FIND *MALL* GASOLINE ENGINE VIBRATORS TO BE THE MOST ADAPTABLE AND EFFICIENT MACHINES ON THE MARKET."*
"ONE *MALL* VIBRATOR DID THIS JOB VERY SATISFACTORY. IT WAS DEPENDABLE AND FAST."*
* NAMES ON REQUEST
"WE USED THE *MALL* VIBRATOR ON DIFFERENT JOBS AND FRANKLY THE RESULTS HAVE BEEN VERY SATISFACTORY. THE CONCRETE IS COMPACT WITH NO VOIDS, HONEYCOMBS OR ANY OF THE DEFECTS COMMONLY ENCOUNTERED IN HAND PLACED CONCRETE." *

YOU, TOO, can have better quality concrete at lower costs by using DEPENDABLE MALL concrete vibrators. There's a type and size — gasoline engine, air, or electric — for every construction job.

In addition to concrete vibrating, MALL power units can be used for CONCRETE SURFACING, PUMPING, SAWING, DRILLING IN WOOD, BRICK, CONCRETE OR STEEL, SANDING AND GRINDING.

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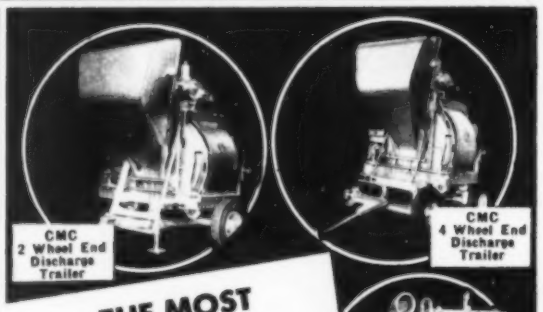

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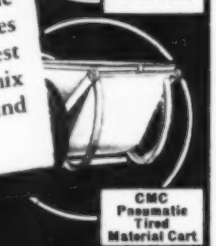
You're RIGHT when you pick CMC. You get the latest in Mixers all sizes — engineered for highest daily output. They mix faster — move faster and are built to "take it".



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Write for catalog showing newest models of Mixers, Plaster and Mortar Mixers, Dual Prime Pumps, Hoists, Saw Rigs, Pneumatic Tired Carts and Barrows. Write today!

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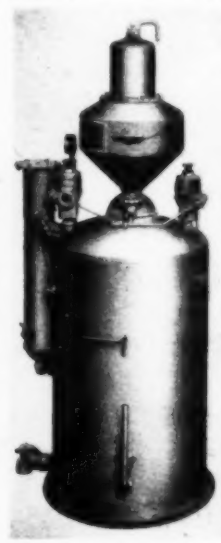
WATERLOO, IOWA

MEDIUM PRESSURE ACETYLENE GENERATOR, said to combine portability with operating advantages usually found in larger units, weighs 129 lb., holds 25 of size 14 ND Union carbide. Will deliver as much as 50 cu.ft. of acetylene an hour at any desired pressure up to 15 lb. per square inch. Several hours of continuous welding or cutting on all except heaviest work can be obtained from one charging. Generator said to produce smooth flow of clean, dry acetylene with no appreciable variations in pressure, particularly valuable in maintaining stable blowpipe flame. Only one handle used to start or stop generation of acetylene and to adjust delivery pressure. After starting, operation is fully automatic. Other advantages: (1) Two relief valves, one for generating chamber and other for hydraulic back-pressure valve, (2) large, hydraulic back-pressure valve which prevents carrying over of water to hose and checks any reverse flow of gases: (3) an interference mechanism which allows only proper sequence of operations during recharging. Generator constructed of steel welded steel parts — **The Linde Air Products Co., 205 E. 42nd St., New York City.**



★ ★ ★

¾-YD. CONVERTIBLE SHOVEL said to be of unusually lightweight construction but to have adequate speed and power for heavy-duty performance. Equipped with 19-ft. boom and 14-ft. stick. Crawlers are 11 ft. 5 in. x 20 in. running on drop-forged, heat-treated rollers. All gears and bearings fully inclosed in dust-proof, oil-tight one-piece cast case, said to eliminate need for greasing and adjustment, to afford protection against metal-cutting abrasives, to reduce friction and prevent misalignments. Drop forged, heat-treated alloy steel gears. Full-floating shafts mounted in ball bearings; ten spline fittings throughout main machinery case; massive double-disk clutches; direct drive from engine to countershaft; power unit mounted integral with operating mechanism; turn-table mounted on four drop-forged heat-treated conical rollers; drums mounted on short, individual splined shafts; single screw crawler attachment packed in grease.—**Universal Power Shovel Corp., Milwaukee, Wis.**

★ ★ ★

NEW PIPE FITTINGS have, instead of bolts, threaded end nuts which screw up on threaded body and compress resilient gaskets tightly around pipe, sealing joint. Outstanding feature of these fittings is said to be their flexibility which prevents failure of pipe lines due to frost, heave, expansion or contraction, traffic shock, vibration, soil settlement or shifting and careless backfilling. Other advantages claimed: (1) Plain end pipe only required — no threading; (2) pipe ends have full strength — no reduced wall thickness necessary; (3) one jointing tool, a pipe wrench, is needed; (4) any one can

MIND IF WE PUNCTURE ONE?

It is sad to see a big beautiful theory ruined by a tiny little fact.

Take the theory about "acid corrosion" of these new hard bearing metals by oils. Some say it is just a "necessary evil"... that operating conditions, pressures and temperatures are beyond the tolerance of today's Diesel lubricants.

Some oils may be forming acids that etch cadmium-silver or lead-bronze or hardened lead, but *all* oils aren't doing it.

We know one that isn't. It is Shell Talpa Oil. If you're interested, Shell Talpa Oil resists breakdown. It does it because it is *made* that way. Correct in viscosity and pour point, low in carbon formers and containing natural inhibitors, this superior oil is quietly disproving the corrosion theory in hundreds of Diesel operations day after day.

Perhaps some day some operator will make the going so tough that even this oil will give way. But until then, please don't accept acid corrosion of bearings as inevitable.

At the first sign of corrosion, switch to Shell Talpa Oil—or, better still, accept the *fact* of Shell Talpa Oil's unusual stability and *start* with it—*before* your bearing trouble comes.

Let a member of Shell's Field Staff discuss Diesel lubrication—or *any* lubrication problem—with you. No obligation, of course, and we believe these men are the most effective group in the business.

SHELL

SHELL TALPA OILS

Move the Earth with BAKERS

SCRAPERS

THAT DIG AT A FLAT ANGLE

The outstanding performance of Baker Hydraulic Scrapers on all kinds of earth moving jobs proves that the flat digging angle really does mean bigger loads with less power.

Easier loading, clean dumping and even spreading make them the most practical scrapers for any job. There are many Bakers on jobs no other scrapers could profitably handle.

You can get Bakers in four sizes — 3, 5, 8 and 10 cu. yd. capacities, for tractors of 25 h.p. up.

BULLDOZERS

WITH TWIN CYLINDER OPERATION

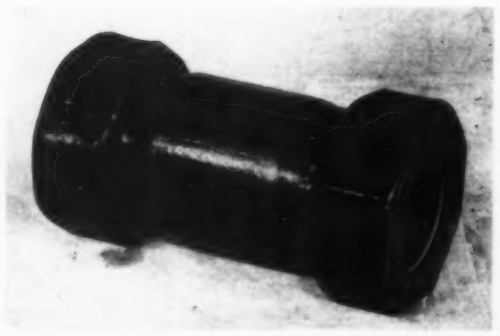
The superiority of Baker Bulldozers and Gradebuilders is in evidence wherever tough assignments are encountered. They give tremendous down pressure to aid in digging into hard material and assure smooth, even surfaces when leveling or spreading, due to perfect blade control. They set new standards of efficiency in hydraulic operation.

With the new models now offered, there are Baker Bulldozers and Gradebuilders for practically every purpose.

Ask for latest bulletins on Baker Hydraulic Bulldozers and Gradebuilders.

THE BAKER MFG. CO.
568 Stanford Ave., Springfield, Illinois

• BAKER •



install, even under water, if required; (5) exact pipe lengths, tedious lining-up operations, large excavations unnecessary; (6) union-type connection is afforded; (7) fittings can be salvaged; (8) economical joint provided. Manufactured in complete line of regular and long couplings, 45- and 90-deg. regular ells, plain-end and threaded-end 90-deg. street ells and street tees. Sizes ¾ to 2 in., inclusive. — **Dresser Mfg. Co., Bradford, Pa.**

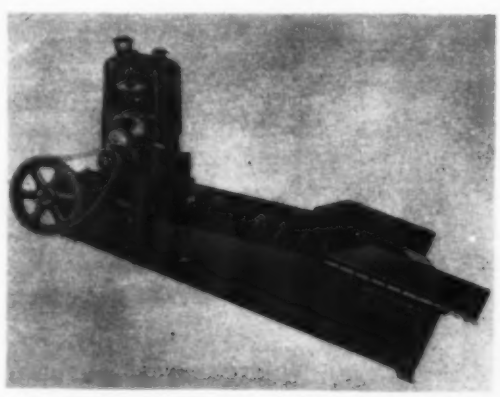
★ ★ ★

MEDIUM-GAGE RUBBER FLOORING, popular priced product, is manufactured in 36-in.-wide rolls 40 to 45 yd. long. Gage, .095 in. Available in seven colors: red and white, plain black, black and white, two-

tone medium gray, green and white, brown and white, two-tone light tan. Said to be resilient to foot traffic and fire and stain resistant. Dirt does not penetrate surface, making use of damp mop adequate for cleaning. Applied in same way as linoleum. — **Goodyear Tire & Rubber Co., Akron, Ohio.**

★ ★ ★

DIESEL-POWERED SAND WASHER, operated by Hercules 4-cylinder power unit 3¾ x 4 in. bore and stroke, is completely self-contained unit with engine readily accessible for servicing, yet out of way so far as operation of washer is concerned. Washer consists of two spiral screws, each 12 ft. long, which



draw aggregates to center of tub and convey them upward to discharge end. Wash water inlets are arranged along tub between two screws. In operation wash water swirls upward through aggregates carrying foreign matter to surface and down to lower waste water discharge end of tub. Timken roller bearings carry upper ends of spiral screw shafts and Cutless rubber bearings are used at lower ends of shafts which are subject to abrading action of sand and water. — **Eagle Iron Works, Des Moines, Iowa.**

★ ★ ★

CAB-OVER-ENGINE DUMP TRUCK is claimed by its makers to give fast and efficient service in contracting field, to be compact and easily maneuverable and to be exceptionally easy to handle on narrow streets and in crowded traffic. Cab-over-engine construction said to save 32 in. in wheelbase with corresponding decrease in overall length and shorter turning radius. Approximately one-third

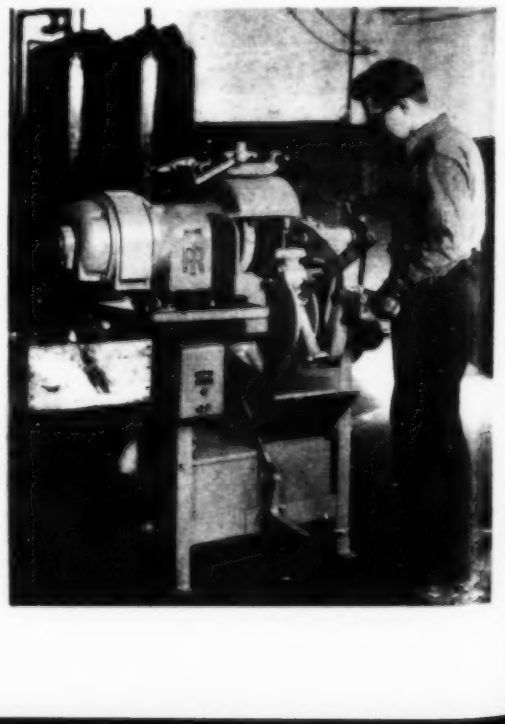
gross weight is carried on front axle; two-thirds on rear, which assures better tire wear and more payload per inch of wheelbase. Wheelbase, standard, 107 in.; special 114, 126, 144 and 162 in. Powered by 6-cylinder engine, bore and stroke 3⅝x4⅜ in., piston displacement, 271 cu.in.; 83 hp. at 3,000 r.p.m. Dry, single plate 11-in.-diameter clutch. Four-speed selective transmission; single reduction, full-floating rear axle; four wheel internal hydraulic brakes, vacuum booster actuated, open spider-type steel wheels with six spokes. — **Mack Trucks, Inc., 34th St. and 48th Ave., Long Island City, N. Y.**

★ ★ ★

AIR-MOTORED PAINT MIXER, designed especially for use on 5-gal. batches, fills out series of clamp-type direct drive agitators and has all regular Pneumix features: Variable speeds through air intake control (30-6,000 r.p.m.) and elimination of fire and explosion hazards through air-motor operation. For use on most flammable materials—varnish, lacquer, gasoline and high explosives — and air throttle control of speed is said to make use particularly important on jobs where viscosity of material changes during mix. Mixer has ⅜-in. chromium plated or stainless steel shaft 12 in. long with one 3-in. triple blade chromium plated bronze or stainless steel propeller. — **Air Brush Co., Inc., 390 Park Avenue, Newark, N. J.**

★ ★ ★

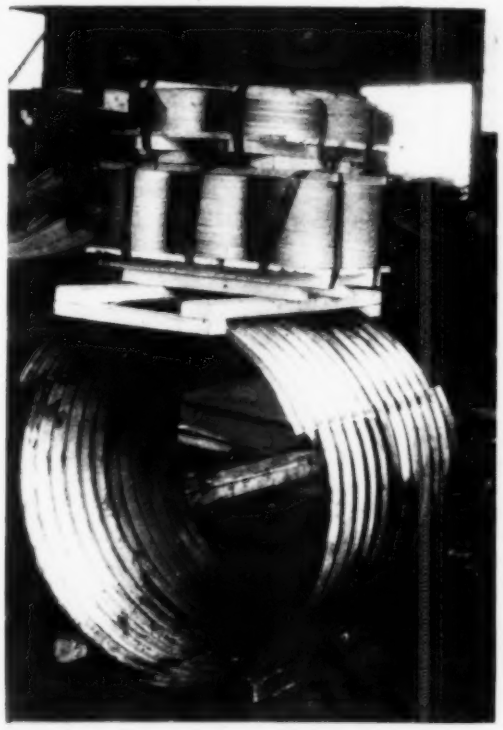
NON-AUTOMATIC JACKBIT GRINDER adaptable for use with all types of standard detachable rock-drill bits used by mines, quarries and construction jobs, has capacity of 35 hard bits or 50 annealed bits per hour. Available for electric, air, gasoline-engine or belt drive. Features: (1) No extra fixtures or wheel dressers required; (2) bit automatically reciprocated across face of wheel while it is being rotated for gage grinding, thus increasing number of bits ground with each individual wheel; (3) all bearings located outside water zone; forming and gaging head yoke bearings underneath grinder; (4) forming



pressure applied by foot pedal making machine easy to operate; (5) cup-shaped rubber collet cushion supports bit skirt, absorbs vibration and reduces danger of chatter; (6) one-hand control for gaging operation; (7) large coolant tubes with easily adjusted nozzles flood bit with water. Forming wheel cuts from center out and water flows over face of bit. — **Ingersoll-Rand Co., 11 Broadway, New York City.**

★ ★ ★

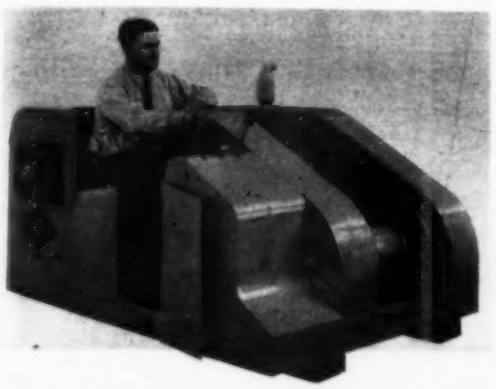
LIGHT-DUTY CORRUGATED LINER PLATE, designed especially for small-diameter tunneling jobs, is available in standard inside diameters of 33 to 60 in. 10 to 14 gage, inclusive. Armco engineers say light, sturdy plate is answer to need for lower-cost liner



plates on tunneling jobs that do not require extra strength of heavier plates — exact weight of plate needed for job can be used. Plates said to be interchangeable of uniform strength from end to end and easily installed by unskilled men, using only simpler tools. Shallow corrugated design requires less excavation. When tunnel liner is to be left in place, light-duty plates can be supplied in galvanized iron. If even greater permanence is desired, plates with special bituminous coating are available. — **The American Rolling Mill Co., Middletown, Ohio.**

★ ★ ★

SAFETY HOIST, 37-hp. double-drum, gasoline model with 4,500-lb. single line pull at 160 to 195 f.p.m. has all moving parts inclosed by steel housing, preventing accidents and keeping cable from becoming intangled in gears. Smooth, effortless operation of hydraulic band friction results in less operator fatigue



and greater production. All operating levers conveniently grouped in reach of operator. Grease packed ball bearings eliminate loss of time. Other features: Improved brakes ball bearing cam operated; no lubricating necessary; skid-type base adds to portability; tool box under operator's seat; ample waterfall of drums with easy visibility of cable from operator's seat; steel gears with machine cut teeth and chain drive run in bath of oil; drums with turned barrels and improved cable anchorages; polished winch heads; weatherproof steel housing can be locked to prevent loss of tools or parts. — **Clyde Iron Works, Inc., Duluth, Minn.**

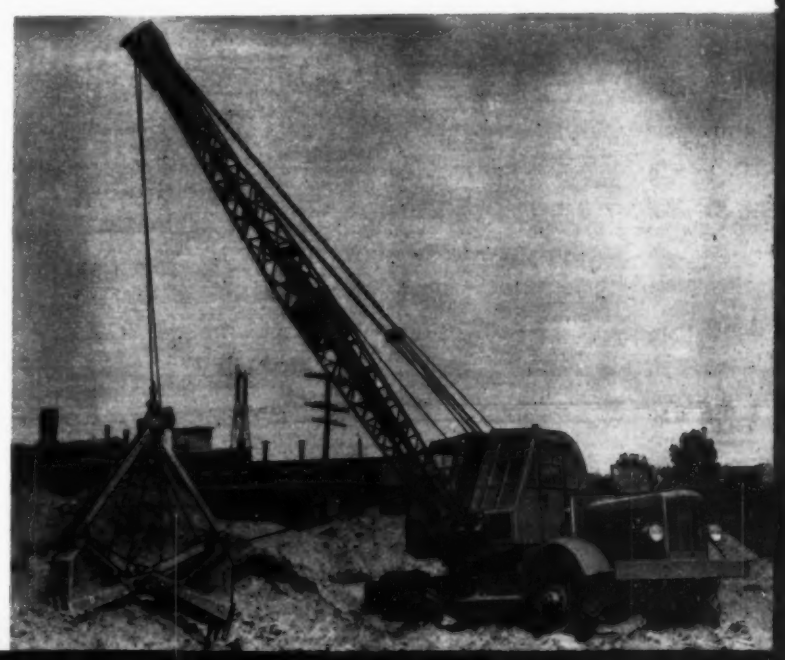
ON THE SPOT...

Does heavy cumbersome equipment put YOU on the spot when competition is keen? Then put a **MICHIGAN** TRUCK SHOVEL-CRANE **on the spot** when and where you choose and watch it earn neat profits from jobs formerly worked at a loss! Here's how MICHIGAN does it-- 1. High daily yardage (no operator fatigue) with fingertip air controls. 2. High speed (28 m.p.h.) from job to job at minimum cost. 3. Downright mechanical dependability! Built for "tough going" all the way through. Send TODAY for MICHIGAN'S "Work Book"... You'll profit by investing in a MICHIGAN!

3/8YD 1/2YD

AMERICA'S TRUCK SHOVEL SPECIALISTS

Single axle -- Dual-Tandem Drive -- Four-Wheel Drive. All convert to Shovel, Crane, Clam, Trench Hoe, Dragline.



Write for Bulletin CM109

MICHIGAN POWER SHOVEL CO
Benton Harbor, Michigan, U.S.A.

It's LATEX
for Comfort
Durability
Economy!

GOODALL

"ALLGOOD-LATEX"

CLOTHING

100% WATERPROOF

JACKETS • OVERALLS

APRONS • HATS

The GOODALL Latex line represents the most economical and satisfactory clothing in its class. Tests show it will give two to three times the service of standard oiled clothing. Every garment exceptionally well-made, in every detail. Light-weight, comfortable, guaranteed 100% waterproof. Will not harden at low temperatures.

For dependable health protection for your men, you won't find *better value,* anywhere! Let us quote on your requirements. Contact our nearest branch.

GOODALL RUBBER CO.

5 S. 36th Street, Philadelphia

New York • Pittsburgh • Chicago • Boston

FACTORY: TRENTON, N. J. EST. 1873

GOODALL RUBBER CO. OF CALIF.

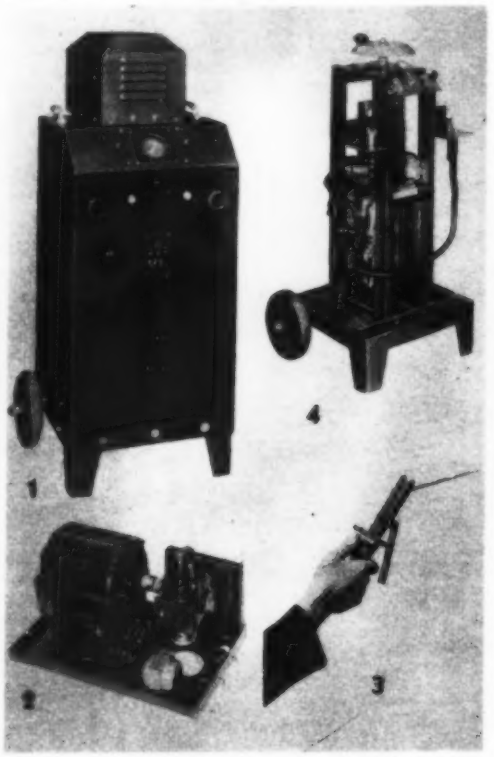
San Francisco • Los Angeles • Seattle • Salt Lake City

GOODALL RUBBER CO. OF TEXAS

Houston

GOODALL — The originators of the Standard of Quality Line — Reg. U. S. Pat. Off.

REMOTE CONTROL SYSTEM, available for all industrial models of Sterling G-R welders, operates through compact switch mounted on welding tongs. Low-voltage relay circuit operated by tong switch controls reversible motor which, in turn, operates full



range "stepless" heat control. Such heat control avoids costly interruptions and improves quality of welding by providing heat required by each type of rod or welding job. Six of seven transformer-type welding models have remote control system. Sizes range from 20-125 amp. unit up to heavy-duty industrial models with maximum output of 1,250 amp. **— Sterling Products Co., 8925 Aguinaldo Culver City, Los Angeles, Calif.**

★ ★ ★

SIX-FOOT FOLDING RULE designed to silence complaint of easy breakage has tough, hardwood sections of 1/8 in. thickness making it not only more durable, but more rigid. Brass plated spring joints have patented locks for maintaining accuracy. Brass strike plates prevent wear of sections in opening and closing. Sections specially finished giving them uniform, light boxwood color making black markings easy to read. **— The Lufkin Rule Co., Saginaw, Mich.**

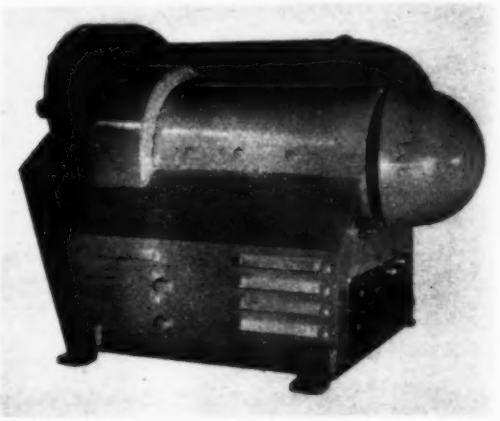
★ ★ ★

WELDERS GLOVE has entire back made from one piece of leather, thus eliminating possibility of burning out seams, troublesome feature of ordinary welders' gloves. Extra wide leather strap protects and reinforces thumb seam and all other seams at points of greatest wear are welted for extra reinforcement. Wool heat breaker is securely sewed inside back of glove to assure insulation against heat. Entire glove made of shrink-proof heat resistant leather

of special tannage and is said to remain soft and flexible under most severe temperature conditions. Economy feature: gloves are supplied in all lefts or all rights or in any combination of lefts and rights at no increase in cost over regular pairs. **— The Industrial Gloves Co., 909 Garfield Blvd., Danville, Ill.**

★ ★ ★

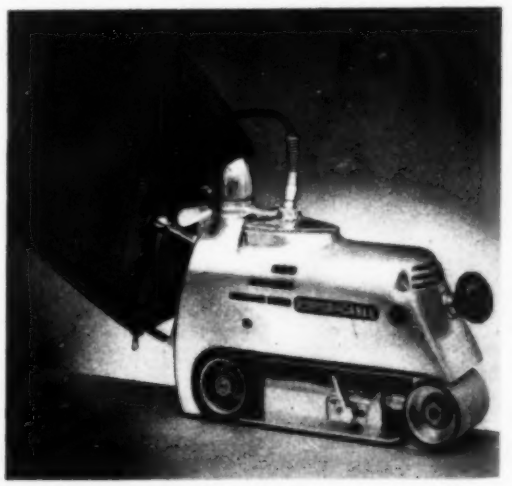
SMALL WELDER, for belt and direct drive, especially suited for use in garages, blacksmith, job welding and machine shops and for contractors' operations, may be directly coupled to gasoline engine, belted to power takeoff from an engine or connected by belt to line shafting or electric motor. Outstanding feature of "Shield Arc Junior" is system of voltage and current control known as Dual Continuous Con-



trol, which permits independent adjustment of voltage and current, giving complete separate control of arc heat and arc penetration and enabling user to get desired size and type of arc either for light sheet metal work or for fabrication of heavier materials. Use of non-inflammable insulation at proper points said to permit operation of machine with relatively large size electrodes at high average current without danger of burning out, thus permitting faster, sustained welding at lower cost. Single operator, variable voltage type generator; arc-welded steel, drip-proof construction; rated at 200 amp.; current range, welding duty, 30-v. arc, is 60 to 250 amp. Machine is 29⅝ in. long over pulley, 18 in. high with base, 15½x19⅝. Net weight, 320 lb. **— Lincoln Electric Co., Cleveland, Ohio.**

★ ★ ★

LATEST MODEL SANDER, for use on wood, metal, stone, glass, plastic materials in manufacturing, finishing, maintenance and repairing operations, has incorporated in it several features said to be helpful in attaining greater production and super finish. It is operated at higher belt speed, has more power



and four-way balance is claimed to make it easier to handle, to obtain true finished surface and to avoid spoilage. Other advantages: (1) Dust collecting system more effective; (2) improved ventilation to obtain cool operating unit; (3) belt change expedited by new lever control; (4) correct tension at high speed maintained automatically; (5) silent chain drive delivers more power to point of work, assuring quiet running machine. **Porter-Cable Machine Co., Syracuse, N. Y.**

★ ★ ★

TRENCH HOE, ¾-yd. machine, is built for handling wide range of materials and is convertible to shovel, dragline, clamshell, crane, skimmer scoop or pile driver. Equipped with tractor-type crawlers for fast easy travel; swivel-type hoe stick pivot bearing designed to absorb shocks by eliminating twists in

NOW STANDARD EQUIPMENT ON ALL LeTOURNEAU MACHINES

The U-20 LeTourneau Carryall depends upon ½" and ⅝" "Flex-Set" Preformed Yellow Strand cables, with wire rope centers, for the economical operation of its famous "cable control."

"FLEX-SET" PREFORMED YELLOW STRAND

A ½" "Flex-Set" Preformed Yellow Strand cable, with wire rope center, handles the blade of the LeTourneau Angledozer.

The "cable control" of LeTourneau Bulldozers is ½" "Flex-Set" Preformed Yellow Strand with wire rope center.

After the most thorough tests and many careful field observations, R. G. LeTourneau, Inc., determined to supply "Flex-Set" Preformed Yellow Strand Wire Rope with every one of their famous "cable controlled" machines leaving the factories.

Thus the greatest economy in operation is assured right from the start; for "Flex-Set" Preformed Yellow Strand is made of "improved" plow steel of highest quality, drawn to our own exacting specifications — and 63 years' experience making nothing but wire rope has taught us what these specifications should be.

Preforming makes the rope limp and tractable — easy to handle and install — highly resistant to kinking — amazingly durable.

Maintain the economical operation of your LeTourneau equipment by replacing worn cables with "Flex-Set" Preformed Yellow Strand.

Distributors In All Industrial Centers.

BRODERICK & BASCOM ROPE CO., St. Louis

Factories: St. Louis, Seattle, Peoria.

Branches: New York, Chicago, Seattle, Portland, Houston.

X17R2

For main line connections use a square knot
For branch-to-main line connections use a half hitch
For the first cartridge in the hole

PRIMACORD CONNECTIONS ..all made by Hand

Simple, isn't it! For the main line use a square knot. For branch-to-main line use a half hitch. For the first cartridge in the hole use either of the methods shown, with a *continuous* length of Primacord, having *no* connections.

Primacord-Bickford is the *improved* Detonating Fuse with a flexible, waterproof textile cover. It is light, strong, easily handled, and "goes" at a speed of 20,350 feet per second!

Send for a free copy of the Primacord-Bickford book. It opens the door to new efficiency and profits in blasting.

The ENSIGN-BICKFORD COMPANY • Simsbury, Connecticut • U. S. A.
Makers of Cordeau-Bickford Detonating Fuse and Safety Fuse since 1836.

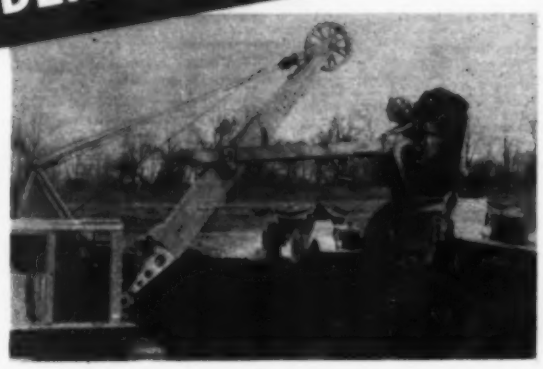
PRIMACORD-BICKFORD *Detonating Fuse*

PB 13

EASIER TO "WEAR IN"...

HARDER TO WEAR OUT...

J-M BRAKE LININGS *and* CLUTCH FACINGS



TO PREVENT COSTLY SHUTDOWNS in the field, operators of this 14-yard shovel use J-M Brake Linings and Clutch Facings on their equipment.

In heavy construction work, you can't afford to waste time giving linings and facings long breaking-in periods. Operations have got to be sure and dependable right from the start. And that's why most leading manufacturers of draglines, shovels, cranes, etc., equip new machinery at the factory with Johns-Manville Industrial Friction Materials.

These tough materials give positive brake and clutch control . . . need only the shortest "wearing-in" time. They are exceptionally durable, mechanically strong, highly resistant to heat and shock. Drum scoring is negligible. J-M Brake Linings and Clutch Facings last longer in any heavy-duty service . . . save power . . . keep replacements few and far between.

• • •

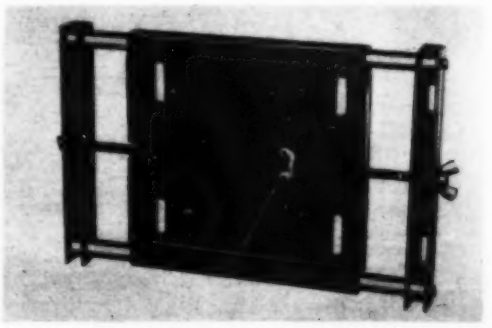
Your own equipment will prove the dependability and economy of J-M Brake Linings and Clutch Facings. For full details, write for brochure FM-7A. Johns-Manville, 22 East 40th Street, New York, N. Y.

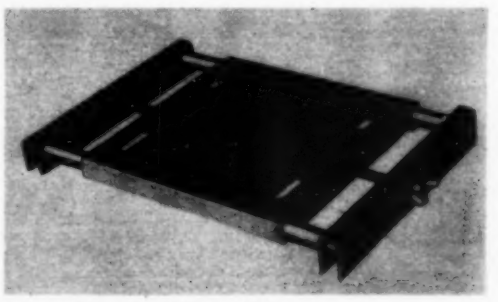
JM Johns-Manville INDUSTRIAL FRICTION MATERIALS

boom Three forward speeds ranging from ⅝ to 2½ m.p.h. Trench hoe will dig to maximum depth of 18 ft., and solid dump bucket will cut trench with side cutters 34, 36 and 38 in. wide; with bottom dump bucket, 32, 34 and 36 in. wide.—**Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.**

★ ★ ★

LOW COST STEEL MOTOR BASE called "Automatic" maintains correct belt tension through action of special high grade steel springs. Especially suited to short center drives. One base covers all types of drives, horizontal, vertical or overhead. Said to operate satisfactorily with any type of load, pulsating, steady or reversing. A few turns of adjusting screws will take up slack from normal wear and stretch. Base moves back instantly giving correct belt tension. Spring tension holds motor, takes up slack and cushions load shock that might otherwise damage

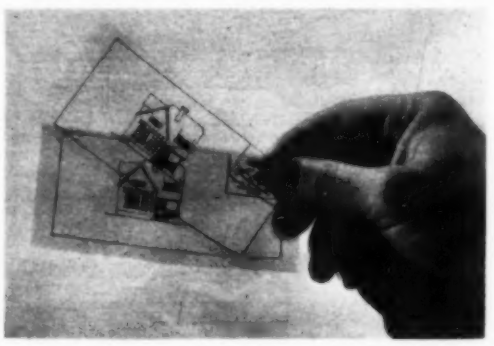




motor and bearings. Motor mounted directly on sliding plate of base, and whole is then bolted down as unit. Belt is changed in as short a time as 30 sec. by releasing spring tension and placing new belt around sheaves.—**Ideal Commutator Dresser Co., 4102 Park Ave., Sycamore, Ill.**

★ ★ ★

IMPREGNATED SENSITIZED FOIL is said to be means of reclaiming old and soiled tracings unserviceable according to every day drafting and print room standards. Foil print of original is made and from this are reproduced whiteprints having stronger lines and clearer background and said to be easier



WE SAID IT 5 YEARS AGO

—Now Hundreds of Users Have PROVED IT!

Back in 1933, we said, "The most practical way to build excavators from the user's point of view is with rolled alloy steels!" Now, users everywhere—hundreds of them—have *proved* that these stronger, faster operating machines are more profitable to own. Designs originated by P&H are gradually being adopted by the excavator industry. P&H has *all* these advanced ideas *now* in this line of excavators—"5 years ahead of the field." User experience is yours for the asking. Harnischfeger Corporation, 4494 W. National Ave., Milwaukee, Wis.

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EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

LOOK

What You Save With ARMCO PILING

ARMCO Sheet Piling is supplied in several designs to meet different job requirements. All types are easy to handle and assure proper alignment.

You can cut job costs with ARMCO Sheet Steel Piling because these sturdy plates can be used again and again. Why buy new piling for every job?

Material costs are lower too. The special corrugated design of ARMCO Sheet Piling assures ample strength without excessive weight. You buy the exact gage that meets your requirements.

Learn more about the money-saving advantages of ARMCO Sheet Steel Piling. Write today for prices and complete information. The American Rolling Mill Company, 371 Curtis St., Middletown, Ohio.

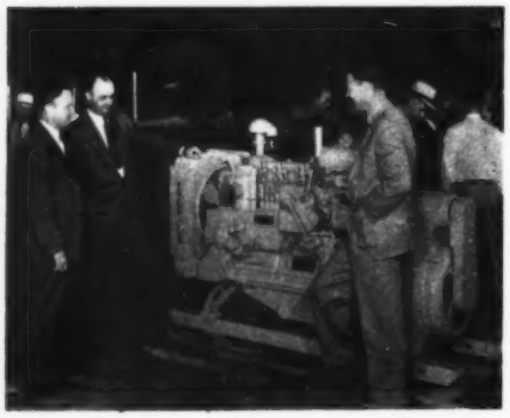
ARMCO

SHEET STEEL PILING

to read than copy from which they are made. Clear foil print may be used as substitute for original tracing when duplicate originals are necessary or may be employed as fast-printing substitute for slow-printing original when speed is desired. In addition, it is possible to use as many as six layers of foil to produce one composite whiteprint. Available also is matted foil which may be printed same as clear foil and which has added advantage of taking pen and pencil lines making it possible to reproduce fundamental design with additions and corrections without changing original. Foil duplicate first is made and part of design to be dropped is deleted either by blockout method or with Ozalid corrector fluid. Changes and additions then are drawn in on the foil from which whiteprints are made.—**Ozalid Corp., 354 Fourth Ave., New York City.**

★ ★ ★

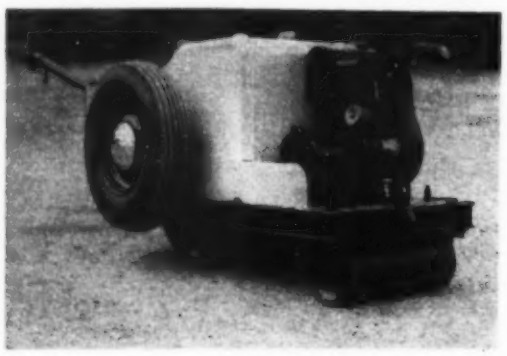
DIESEL ELECTRIC GENERATOR SETS, of 15- and 20-kw. capacity, are designed to bring low cost lighting and power to construction jobs where they can pump water, provide current for refrigeration, lights, radio, small tools, grinders, bunkhouse, shop, commissary, office and street. Also for floodlighting large operations, handling small miscellaneous loads, providing light on dredges and operating floodlights and welders on large draglines. Two



sizes available: (1) 3-phase, 110, 220 and 440 v. at 15 kw., .8 power factor and also as single-phase 110/220-v. three wire type; and 110 and 220 v., two wire type at 13 kw., .8 power factor; (2) 3-phase, 110, 220 or 440 v. at 20 kw., .8 power factor. Also available in single phase, 110/120 v. three-wire type; and 110/220 v. two-wire type at 18.5 kw., .8 power factor. All electrical equipment required by sets inbuilt with exception of circuit breaker. Installation consists of only two wire connections — one from generator terminal to circuit breaker and other from circuit breaker to distribution box. No special base needed for lightweight sets — they can be set down anywhere and put to work. Engines have three operating adjustments. Generators of single unit construction equipped with ball bearings which require lubrication only once in six months. Serviced by Caterpillar distributor organization. — **Caterpillar Tractor Co., Peoria, Ill.**

★ ★ ★

IMPROVED MOTORIZED WHEELED ROLLER for use on patch and restoration work has three principal improvements: (1) New clutch arrangement; (2) lowering of operator's controls; (3) "tongue-up-and-over" mechanism which changes unit from trailing to



rolling position in 60 sec. May be attached to any maintenance truck when it is ready to trail at desired speed. Makers claim that patch rolling can be done at extremely low cost because roller can be moved without delay and to any destination. Recommended for use of street and highway departments, contractors, parks, cemeteries, airports, street and steam railways and public utilities.—**Littleford Bros., Cincinnati, Ohio .**

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use

TRUCK DRIVERS GUIDE — **Dodge Truck Division,** Chrysler Corp., Detroit, Mich. (7 pp., 4x8¾-in. size) Suggestions on how to keep truck operating costs down and drive with maximum safety. Covers care and treatment of truck-engine; how to make tires last longer; importance of proper treatment of clutch, brakes and transmission, safety and courtesy on the highway.

★ ★ ★

WATTHOUR METERS — **General Electric Co.,** Schenectady, N. Y. (20 pp., illustrated.) Bulletin GEA-3114A describes in detail the company's single-phase type I-30 watthour meters, "wide-limit" recording equipment suitable for both large and small loads. Available in front-connected and socket-connected models. New driving element has compound shunt for high and low current valves and new light-load and lag adjustment.

★ ★ ★

ROOTER AND CRANE—**R. G. Le Tourneau, Inc.,** Peoria, Ill. (Two folders, illustrated.) Two new pictorial folders filled with job pictures and engineering data showing methods of increasing scraper and tractor efficiency are now available. The rooter folder, based on actual job data, explains how a rooter can be used to extend scraper savings over 30 per cent wider range and give more pay load profit in 40 per cent faster loading time with a savings in equipment. Hardpan, limestone, shale, gravel, and frozen ground, after being "rooted," can easily be handled by scrapers. The second folder gives the advantages of a tractor crane — mobile and powerful as the tractor, portable as a truck — and shows how the "same power that digs ditches, builds highways, throws up dikes, does fine grading" can be made available to handle heavy, awkward loads up to 10 tons.

★ ★ ★

HAND TOOLS — **Armstrong Bros. Tool Co.,** 317 N. Francisco Ave., Chicago, Ill. (229 pp., illustrated.) Line includes tool holders of all types; pipe tools, vises, cutters, pipe wrenches and chain tongs; drop-forged clamps; wrenches of carbon and alloy steels; ratchet drills, star drills and other machine shop specialties.

★ ★ ★

TANK PAINTING PROBLEMS — **American Asphalt Paint Co.,** 43 E. Ohio St., Chicago, Ill. (Folder; illustrated.) Explains how to obtain maximum results with Valdura products in painting interior and exterior surfaces on all types of tanks and supporting structures. Among topics covered are: General instructions and surface preparations in applying tank finishes; how to paint metal, wood and concrete tanks, both interior and exterior surfaces; how quickly to estimate surface areas and amount of paint required on various sizes and styles of tanks and supporting structures.

★ ★ ★

SAFETY EQUIPMENT—**American Optical Co.,** Southbridge, Mass. (99 pp., illustrated.) New industrial safety equipment catalog describing in detail complete line of eye, head, and lung protective equipment and safety clothing. Industrial protection from head to ankles is provided. Among items described are goggles for protection against impact, glare, splashes of liquids, particles of dust; welding helmets, face shields and respirators; and safety gloves, suits, sleevelets, leggings, aprons, hats and hoods. Special items of protection in respect to safety clothing can be made to order to meet unusual requirements. Valuable information and advice is incorporated in the descriptions of safety equipment.

They simply eat it up

SEE WHAT READERS OF "METHODS" SAY ABOUT THEIR CHOSEN PAPER

In common with other McGraw-Hill publications, *Construction Methods* has established a continuing program of editorial research which is conducted by a staff of specially trained inquirers. The members of this staff make personal calls on subscribers at work in the field and in their offices in all sections of the country — to question them as to their appraisal of *Construction Methods*, how they use it, what they like best, what they pass up. On each visit a specific issue is gone through cover to cover and every page and every item weighted according to its value to the interviewed subscriber. An original and far-sighted step in journalistic practice, the object of the plan is to help the editors gage the needs of subscribers so that a progressively better publishing service may be provided. These research visits in no way replace the vast field contacts of *Construction Methods*' editors but augment them and draw out frank expressions that readers sometimes are reluctant to give to the editors themselves.

Believing that readers will benefit from a knowledge of what their colleagues find of value in *Construction Methods*, we are publishing a series of advertisements in each of which we quote interviewed subscribers.

A contractor specializing in bridge work in Ohio

Construction Methods is like Life or perhaps I should say Life is like Construction Methods because your paper is one of the first completely pictorial publications that I remember. The advertisements are always interesting.

Superintendent for a general contractor in Illinois

The advertising pages and the pictures are what interest me most. The pictures usually tell the story perfectly. The advertising, I think, is tops. From these alone I get a good idea of what equipment will do. I particularly remember one advertisement because it contained a picture of one of our laborers using an electric tamper. The clearness of the advertisement was very good. It had to be in order for us to be able to detect our man. "Job Oddities" and "News Reel" always have been of interest and I wonder sometimes how you get all of them. The magazine satisfies me very well, but what is more important it does it in a pictorial manner.

Owner of a construction company in Massachusetts

I like the equipment pictures. They're always interesting. Right now I'm interested in concrete mixers. I've got an old one and it's about to wear out, so I am going through your magazine and looking at all the different advertisements on mixers. Although my business is mainly that of house building, the pictures that you publish about other kinds of work are most helpful.

Secretary of a contracting organization, Philadelphia

You have a great idea in publishing an illustrated magazine like Methods. It fills the bill nicely with men who lack engineers' training and yet it is of interest to those who have a training, because after all everybody is interested in pictures. All of us look forward to its receipt each month. I start at the front cover and read everything, including the advertisements in order of continuity. Our file of back numbers contains issues for twelve years.

Chief design engineer in a Wisconsin municipality

Through pictures shown in either your "Construction Equipment News" section or advertising pages I have bought a bulldozer, a 4-yd. scraper and two diesel 120 hp. Caterpillar tractors. Advertising is an important part of the magazine to me.

A general contractor in Cincinnati

It does not take long to read Construction Methods. The print is large enough and very often the pictures tell you more than the text. I like articles that tell how somebody else did certain jobs and I find a lot of them in this magazine. I usually pick it up three or four times. And one thing I like about it is that you can pick it up and read it for five minutes or fifteen minutes and lay it down without breaking any sequence of text such as you would do in long articles.

An assistant engineer with the Big Four railway system

I like Construction Methods better than any of the other papers in the field. It is not cluttered up with a lot of technical data and long-winded dissertations. If I want technical text I can get it in plenty of textbooks. I do not want a lot of formulas and heavy mathematics in the magazine that I read. That is why Construction Methods so adequately fills my need. When I get home and a new copy of this magazine has arrived I will sit down and look through the paper until supper is ready. Then I will go back to it five or six times until I complete reading it. I read about everything in the magazine before I lay it aside. It doesn't come too often, which is a good point. You have a chance to finish one issue before the next one arrives. The pictures are good and there are plenty of them. The print is easy to read. Altogether I think Construction Methods is a very good magazine and I will keep on subscribing just as long is it keeps up its present practice.

Assistant city engineer

I started a scrap book some time ago of the cartoons in Construction Methods. People around the city building are always looking it over. Some of the cartoons are really screams. I always read the magazine thoroughly and find it interesting. I have every issue except one since I started my subscription. I look over the advertisements as well, particularly when in the market for equipment and at such times I go back over the old issues to see what is advertised. Right now I am particularly interested in disposal plant work because we are starting a project that will run close to a million dollars. Consequently, I am going through back issues of Construction Methods as well as the current issues for pointers.

Architect with contracting firm specializing in building

Our work requires a pretty widely diversified list of business papers. Notwithstanding this fact Construction Methods has a wider readership than most. I find it relaxing to read it compared to the more technical papers, but at the same time it is definitely worth while. I thoroughly enjoy the cartoons. To me the advertising is an important part of the paper. I do not miss an advertisement nor do I overlook anything in the new products section. The magazine is unique and I would have no part of it changed.

President of a building contracting company in Pennsylvania

Our business is designing and constructing industrial buildings, and our reading of trade papers is confined to articles of this nature. Construction Methods is a pleasant departure from the more technical papers dealing with the subject. I look at all illustrations whether or not I take time to read the accompanying text. Advertising is of interest and those advertisements bearing on our type of construction are always read. A file of back numbers is kept for about two years.

And when a Haiss bucket licked this dredging job for a bridge pier foundation where others had failed—*enough said.*

PRICES AND CATALOGS ON REQUEST

HAISS Hi-Power

FOR PAY LOAD CLAMSHELL DIGGING

In stock at New York, Philadelphia, Baltimore, Atlanta, Hartford and Los Angeles

GEORGE HAISS MFG. CO., INC., 139th ST. & CANAL PLACE, NEW YORK—DISTRIBUTORS EVERYWHERE

A CHAIN IS NO STRONGER THAN ITS . . .

FITTINGS

For that tough job—LAUGHLIN drop forged chain fittings are the answer. LAUGHLIN Shackles, Turnbuckles, Missing Links, Hooks and Swivels have a reputation for quality that is built on performance. ALL LAUGHLIN Fittings are drop forged in a modern plant with the latest precision equipment. Send for catalog.

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PORTLAND · MAINE

"Contractors Like It"

THE above photograph shows the Flex-Plane finishing machine, as being used by the War Department on Scott Field at Bellville, Illinois. The vibrated screed brings up enough moisture from the dry mix for surfacing.

FLEXIBLE ROAD JOINT MACHINE CO.

WARREN, OHIO

Skid-proofing ICY ROADS

GRITS TREATED with calcium chloride provide a means of skid-proofing icy roads. The chemical when mixed with stock piles of sand or cinders, at the rate of from 50 to 100 lbs. per square yard, has a double benefit, according to the Calcium Chloride Association. In the first place, because of its anti-freeze property, the calcium chloride serves to keep stock piles completely workable by shovel and truck crews. There is no time wasted trying to "blast 'em loose." The stocks are ready at once. Truck crews load up and spreader machines or shovelers have no trouble distributing.

Then, the moment the treated grits hit the surface of the ice, chemical action goes to work and before traffic can knock the valuable stuff off or brush it away, the abrasives have bitten into the already melting ice and a sandpaper-like surface results. Braking is safe, reliable and sure.

* * *

War's Impact ON CONSTRUCTION

(Continued from page 39)

transportation facilities, both by rail and by highway. Heavier traffic is bound to stimulate railroad maintenance work. Since the last World War a great program of highway construction has been under way in the United States. Our highway transport facilities, however, are far from adequate and during recent years diversion of highway funds for other purposes than road building has been rampant. The threat of war will focus attention upon the highway as an essential element of national preparedness and there would seem to be no justification for a cut in the volume of new highway construction and maintenance.

For strengthening our own defense measures, the nation will call upon the construction industry for an accelerated program of building airports, naval bases and flood control projects, particularly in those areas thickly populated by industrial establishments where flood damage would mean curtailed production. To provide for increased shipping needs, construction and rehabilitation of docks and wharves should be active.

It appears probable that housing will continue at its present, if not at an increased, rate. General re-employment will produce more purchasing power and it is likely that a fair percentage of these funds will find their way into residential construction even in the event of higher prices for building materials. Paradoxical-

(Continued on page 98)

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Contractors who own and operate Heil Dig-N-Carry scrapers on nationally famous construction projects are just as "Profit-minded" as you are . . . They have used other types of dirt moving equipment and have proved to their own satisfaction that the efficiency and dependability of Heil Hydraulic scrapers actually means *lower dirt moving costs per yard* —You, too, can cash in on the money-saving operating features of Heil Dig-N-Carry design — NOW is the time to investigate — Ask your nearest Heil distributor to give you facts and figures or write today for free Heil equipment manual covering the popular Heil line that helps you make more money! Address:

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(Continued from page 96)

ly, past records indicate that increased costs do not necessarily deter residential building construction.

Within the next few months there should develop an increased demand for skilled labor, coupled with a slash in WPA payrolls as expanded industrial activity provides more private employment. War-time public opinion will not support labor strikes that curtail essential industrial production.

There may be a drop in the volume of public building, such as post offices, schools and similar structures, and in municipal works, but on the whole the construction industry, it is believed, can look forward to a step-up in the tempo of its activities and the creation of more jobs.

★ ★ ★

INCREASED EQUIPMENT YARDAGE

(Continued from page 61)

McDonald Construction Co., at Riverhead, L. I., last year, I was much pleased to learn that this company actually kept a complete daily record of the output of its scrapers and shovels. In my experience with various contractors on Long Island, this firm is the only one that has taken an interest in a tabulated record of the accomplishments of its equipment and operators. The company's records enable it to figure future jobs intelligently and to eliminate most of the guesswork on costs of handling sand and other materials.

By neglecting to keep daily records, I feel that most contractors have sacrificed an important check on the use of machinery on the job. When they buy equipment they have in mind only the work that the machine can accomplish. Few contractors have any kind of check upon production to ascertain whether the machine is fulfilling expectations. Operators' daily reports are rarely used.

Daily Mechanical Report — In my early days as a tractor operator, I thought that a daily report to the master mechanic on mechanical needs might work out to advantage by eliminating errors due to word of mouth instructions. My daily requisition was made out in duplicate, and I retained a copy. Each day I requested the adjustment of a particular part of the tractor and some tools which were necessary on the tractor during the shift. After three days, I saw that the innovation was not wanted, and I went back to the old method of telling the boss of all my tractor needs. It's the best way of getting quick results even if it is inefficient.

Summary — When contractors and designers of equipment give more thought to the actual producer, the operator who runs the machine, there will be a marked change in the construction business. The average operator is proud of his ability to do good work. If he is given a little praise once in a while, he will amply repay the kindness.

Build him a seat that is hydraulically cushioned, eliminate as much noise as possible with mufflers, protect him against the elements with insulated cabs, give him greater visibility of his work, take his personal suggestion concerning additional improvements for the value that they may contain, and soon the losses prevalent on jobs today will decrease. The operator will be happy in his work and will give full cooperation and loyalty to the contractor.

★ ★ ★

Pennsylvania Turnpike Tunnels

(Continued from page 58)

In the five other tunnels, which penetrate strata having medium to gentle dips, vertical holes were preferred. If horizontal borings had been attempted in these five tunnels, control would have been difficult, as the drill bits doubtless would have plunged with the dip of the rock strata, carrying the bores outside the templets of the tunnels.

During the course of horizontal core boring in Kittatinny tunnel, the drill in the west heading penetrated a zone of loose sand under hydrostatic pressure at a distance of 179 ft. from the face. To explore this sand-seam area, a special drilling program comprising inclined and horizontal core bores was undertaken. The basic plan of these holes when completed formed a cone-in-cone pattern with the large end of the cones in the sand-seam area. At this seam, the holes were spotted on the circumferences of circles 100 ft., 50 ft. and 25 ft. in diameter. Special drilling for the sand-seam problem required 1,641 ft. of core borings.

Apart from this special drilling, the core-boring program for the tunnels included 1,445 ft. of inclined holes, 3,494 ft. of horizontal holes and 10,269 ft. of vertical holes, making a grand total of 15,208 ft. Dr. Arthur B. Cleaves, chief geologist for the Pennsylvania Turnpike Commission, who was in charge of the exploratory core drilling, supplied the accompanying photographs and the data for these notes.

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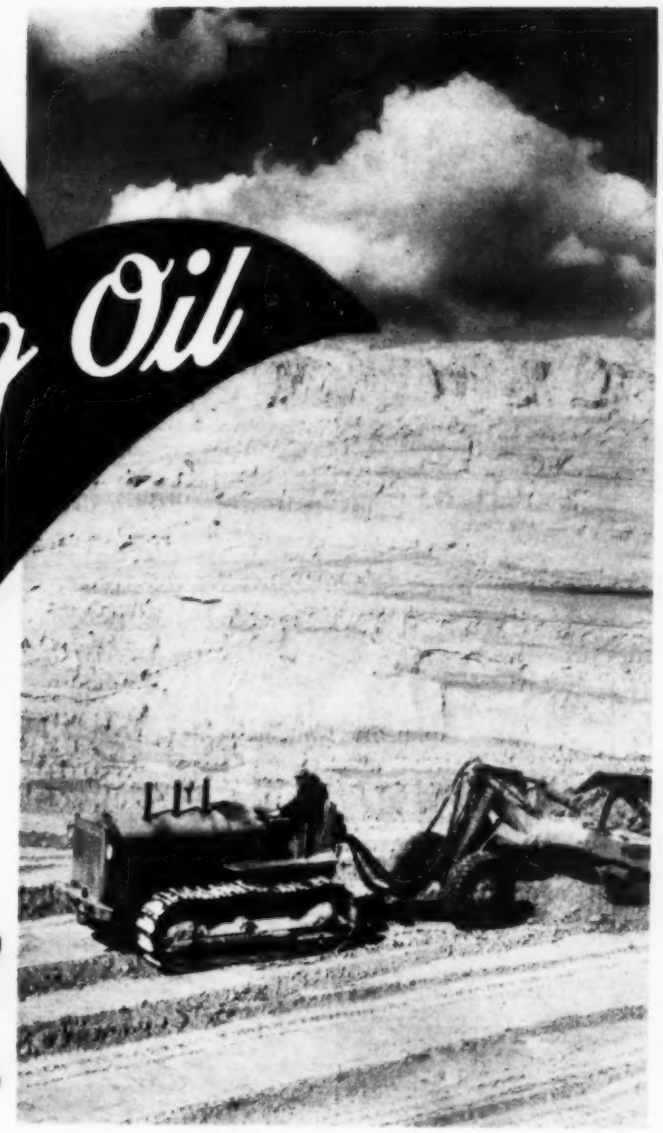

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Unlike oils of other types, Lion Naturalube does not form troublesome carbon deposits, but, because of its natural solvent power, Lion Naturalube gradually removes hard carbon deposits from pistons, rings, and valves, thereby restoring power and reducing fuel consumption.

There is another money-saving feature: Lion Naturalube's stronger natural protective film provides a full measure of protection. Even under extreme operating conditions this stronger natural film will prevent excessive friction-wear.

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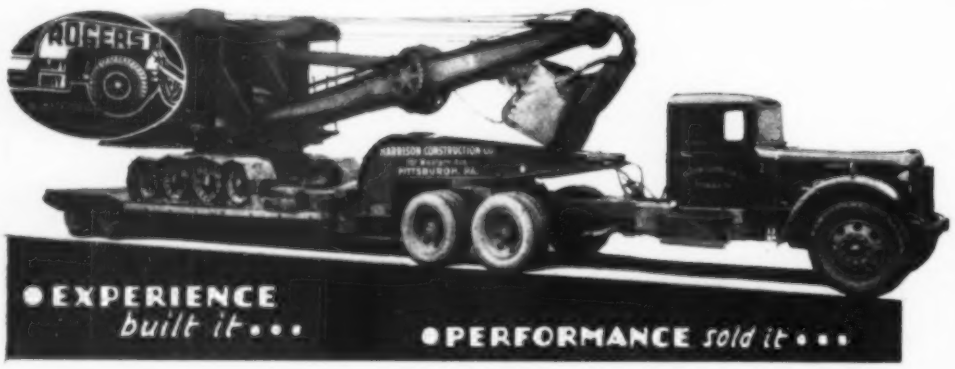
exclusively FOR 25 YEARS



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TURNTABLE AND ENGINE HOUSE REST ON *Concrete Caissons*

(Continued from page 65)

signed to carry locomotives up to 200 tons. The steel bridge for this table, weighing 70 tons, required three 50-ft. flat cars to transport it to the site. After being placed in position on a parallel track supported by timber cribbing, the two end cars were released and withdrawn, leaving the bridge resting on the center car.

Two locomotive cranes at opposite ends of the bridge then picked up the 70-ton load and swung it into position on its permanent supports. In its completed form, the turntable weighs about 130 tons. Two 75-hp. electric motors rotate the table.

Quantities — Approximate quantities of materials required for units included in the McCloskey contract were 17,000 cu.yd. of concrete, 1,000 tons of reinforcing steel, 400 tons of structural steel, 750,000 brick and 585,000 b.ft. of lumber. A large part of the structural steel went into the framework of the machine shop and the roof framing of the welfare building.

Coaling Station—A 750-ton-capacity reinforced-concrete coaling station serving three tracks was erected by the Ogle Construction Co., Chicago, using a steel boom on a laced steel mast to handle forms and to place concrete from buckets. The boom could be raised on the mast as the work progressed upward.

Two buckets, holding 63 cu.ft. each, deliver coal from track hoppers into the overhead bins at the rate of 120 tons an hour. Steam locomotives are sanded at the same point, provision being made in a section of the coaling station to store 75 tons of wet sand and 15 tons of dry sand.

Under the same contract, the Ogle Construction Co. built a steel sanding tower straddling a single track for electric locomotives. This tower holds 19 tons of dry sand.

High-Pressure Steam Supply — Steam for heating the enginehouse and related buildings, for power and for washing locomotives is carried to the enginehouse from a local steam generating plant through nearly 7,000 ft. of 8-in. welded steel pipe. With the exception of 50 ft. of pipe crossing underneath tracks in the vicinity of the enginehouse, the line is constructed entirely above ground. The pipe is incased in 3 in. of 85 per cent magnesia insulation, covered with asphalt-saturated felt. Edward H. Reuss, Jr., Inc., Philadelphia, constructed this pipe line.

Administration — Engineering and construction operations were carried out for the Pennsylvania Railroad under the general direction of W. D. Wiggins, chief engineer. At Harrisburg, F. W. Heckel, Jr., assistant engineer, was in charge of construction.

WATCH THE WINNING BIDDER!

Rex Pumpcrete's low cost per yard in placing concrete in the forms has helped many a contractor to be the winning bidder.

Rex Moto-Mixers, with their low cost per yard mile, have kept many a contractor in the "low bidder bracket."

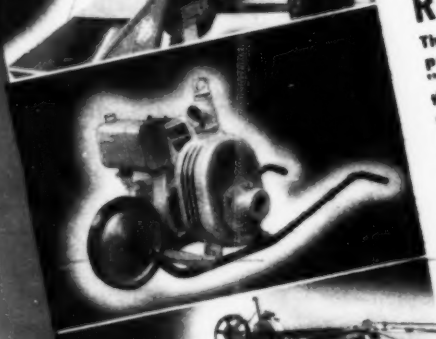
SEE HOW OFTEN HE'S A REX USER!

Low figures and winning bids don't "just happen"—they come from knowing the job problems and the cost of using the most efficient methods and equipment to do the job! That's why you'll find more and more of the winning bidders for all types of concrete jobs in your area figuring concrete mixing, hauling and placing costs on the basis of the low-cost performance of Rex Mixers, Pavers, Pumpcretes and Moto-Mixers. They know that Rex equipment gives them a safe, sure way to keep costs low—to keep them in the low bidder bracket. Give yourself this real advantage—get a greater share of the jobs awarded in your area—buy Rex, and be right! Send for new free catalogs on the Rex machines which interest you. Use the handy coupon.

CUT YOUR COSTS, TOO . . . . . WITH REX—THE QUALITY LINE

REX MIXERS

Mix better concrete and make more money on jobs of all sizes with one of these Rex quality-built mixers—each with more "Rextra" features that pay off in profits. Sizes 3½-S to 14-S, End and Side Discharge models.



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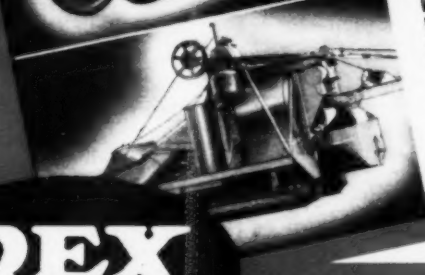

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Before you figure on any road building job, see the Rex 27-E Single Drum and the Rex 34-E Duomatic Pavers for 1939. Backed by the thousands of miles of experience behind the Rex 27-E, the Rex Mechanical Man now brings automatic, perfectly timed control to the 34-E Paver field. Send for details.

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Fibre Board Siding INCLOSES LOW-COST HOUSES

(Continued from page 67)

and cover the outside wall surface. All the products have a specially treated tung oil base and contain a large amount of asbestos fiber. Their outstanding characteristics are their long-time adhesion and pliability.

Joints between Homasote sheets and around door and window frames are sealed with Dum Dum Plastic. This material has the property of skin-drying on the surface while the under-surface portion remains plastic. Because of its unusual adhesive qualities and permanent flexibility, the plastic sealing compound is expected to eliminate all trouble with joints. In the interior walls and ceilings, the same plastic compound is used to fill joints between fiber board sheets before the joints are covered with wood molding.

Another use is found for the plastic material in filling nail holes in the wall board. For this purpose the plastic compound is mixed with patching plaster. After a hole has been filled, a piece of wire window screen is pressed on top of the filler while still soft to produce a texture corresponding to that of the wall board.

Protective Coat—To provide permanent protection for the exterior wall surface, the builders used semi-plastic Dum Dum Masonoc applied with a brush to a thickness of 3/32 in. on top of Dum Dum Masonoc primer. The primer is flowed on with a brush and stippled into the pores, penetrating the surface to form a strong bond and to act as a seal coat to prevent absorption of the vehicle of the finish coat. The Dum Dum Masonoc, applied in a heavy coat on top of the primer, has the ability to skin-dry, with the under surface remaining in a semi-plastic, pliable condition, allowing for considerable expansion and contraction without fracture of the film.

Interior Paint — Interior walls and ceilings of Homasote are given three coats of paint. The first coat is a primer recommended by the wall board manufacturer consisting of one part cut shellac and one and one-half parts denatured alcohol. For the second and third coats, the builders use standard wall paints of selected colors.

Wood Frame — Douglas fir framing is used instead of yellow pine to avoid warping which would pull nails out of the wall board. Although fir costs about $40 more for framing a $2,900 house, the builders believe that use of straight lumber may effect a saving equal to this excess material cost by reducing carpenter labor during erection.

Floors — A 4-in. concrete floor slab reinforced with 45-lb. welded wire mesh underlies the entire superstructure of the house. The builders insulate the slab with 1/2-in. Homasote board laid in two coats of hot tar. On top of this layer in living

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THIS book provides a simple chart system that gives construction costs at a glance and takes long and tedious headwork out of estimating. Over 400 of the charts are given in ready form for handy use, and cover the estimating of transportation, labor and material costs for all kinds of construction work. The book also presents a complete model estimate for a typical small building, together with a step-by-step description of the methods followed in making it.

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room and bedrooms is placed a finish flooring of 3/16-in. Masonite tempered Presdwood cemented to the Homasote with Dum Dum Adhesive. The adhesive compound is a heavy, waterproof, plastic material which is expected to remain pliable indefinitely and preserve the bond between subfloor and finish floor despite any movement that may occur.

In the kitchen and bathroom, the finish floors are Congoleum-Nairn Treadlite linoleum laid on the insulating board in accordance with the manufacturer's specifications.

Experimental Roof—On the demonstration house, A. D. Ferris, research engineer in charge of the program for the American Gas Service Co., applied an experimental roof of ¾-in. Thermasote board, manufactured by the Homasote Co., Trenton, N. J. Overlaps of the roof board were cemented with Dum Dum Adhesive, joints between sheets were sealed with Dum Dum Plastic, and the roof was given a protective coat of red Dum Dum Masonoc on top of primer. Although the manufacturer has never recommended Thermasote for roofing, Mr. Ferris believes that a roof constructed in this way will prove durable, sound and satisfactory.

TWO-SECTION DISAPPEARING STAIR gives access to attic. Pressed fiber finish floor is cemented to subfloor with elastic adhesive material. Temporary gas stove, at left, keeps house warm during cold-weather construction.

Standard roof construction for all houses except the demonstration unit call for 1x6-in. t.&g. sheathing covered with 210-lb. square-butt asphalt shingles laid on 30-lb. saturated asphalt felt.

Wood Siding—Some of the houses in the present development have clapboard or V-joint drop siding of yellow pine applied over 30-lb. building paper on top of the outside sheathing of ½-in. fiber board. Wood siding of this type costs about $100 more for a 4½-room house than the

(Continued on page 104)

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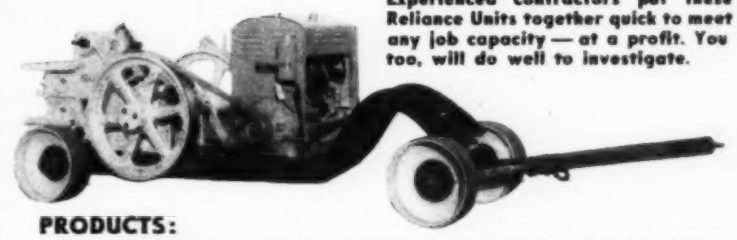

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1. Eliminates the changes in your *present* Batcher Plant Equipment, which is necessary with larger size pavers.
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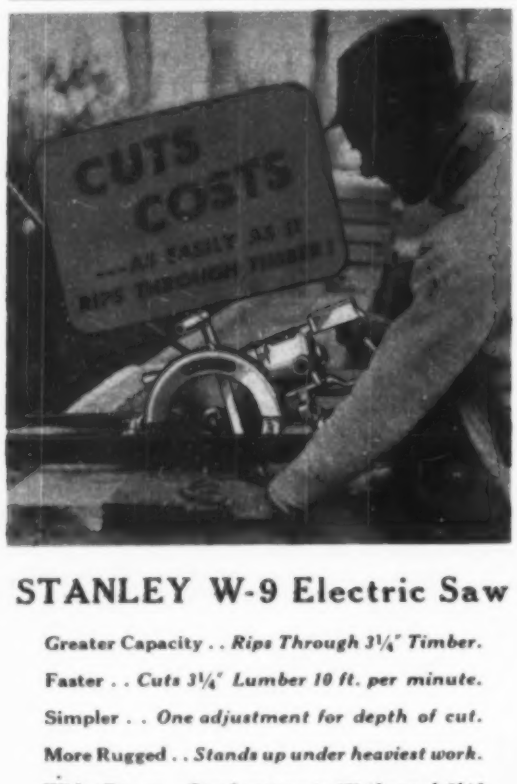

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Simpler . . *One adjustment for depth of cut.*

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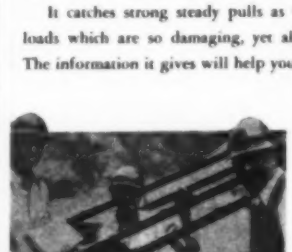

Three sizes for all lines from 3/16" to 2¼" diameter. Write for details. Ask also about the Martin-Decker Measuring Line Weight Indicator!

MARTIN DECKER CORP.
LONG BEACH CALIFORNIA

(Continued from page 103)

semi-plastic protective coating, which is applied at a cost of 7½c. per square foot.

$3,000 House — For a selling price of $3,000 ($3,400 with lot) the Greensboro corporation builds a 4½-room house having an inclosed floor area of 789 sq.ft. Construction is the same as for the $2,900 house, with fiber board siding protected by semi-plastic coating, but the more expensive house has a wood-burning fireplace in the living room. All houses have outside terraces and trellises, resembling those on the exterior of the demonstration house.

Heating Costs — As the houses are equipped to use tank gas delivered by truck, they are not placed on streets served by gas mains. Each house is fitted with a complete set of storm windows. Effective insulation by the fiber board and efficient heating by a forced-air gas unit are expected to hold the cost of gas for heating and cooking to not more than $92 a year in one of the small houses.

* * *

Florida Overseas Highway

(Continued from page 69)

uniformly. Working in this way, trusses on one side were moved the 4 ft. required in about 5 hr. Then splices were welded in the main bottom cross girders, and the wind and cross bracing in the top of the structure reconnected, all within 24 hr. of the time the trusses were first cut loose.

With the trusses of one side shifted, the main cross girders were cut on the opposite side and those trusses were shoved out 4 ft. in the same manner. Before the shifting of them began, the 2½-in. threaded shafts in the adjustable struts were taken up to their closest position. The struts also were moved out so the end pair of clips on each of them, shown in the drawing, engaged in the top chord of the truss. This change permitted the struts again to be extended when the second truss was shifted, the clips on the other end of each of them still being engaged over the top chord of the truss on that side of the structure.

When the second truss had been shifted and reconnected, all of the floor beams were replaced to carry the deck for the 20-ft. highway. A new mechanism also was installed to operate the draw, the turntable on which the draw rests in the open position having been rebuilt to accommodate the new width of the structure. All of the changes in the structural work of the span were electrically welded. The shifting of the trusses and the reconnections had been handled with such accuracy that the span was easily swung back into a closed position without any alterations after the widening was completed.

Stabilizer Plant FOR MICHIGAN SOIL ROAD

(Continued from page 73)

metal and the edge forms, and the second layer went completely across the full width of the road, covering the existing metal and the first layer of compacted fresh material. On the longest haul from the mixing plant, about 8 mi., a fleet of 17 to 19 trucks transported material to the road. During the early part of the job, the trucks carried 4 yd. per trip, but this load later was reduced to 3 or 3½ yd. to save wear and tear on the vehicles.

Truckloads of material were distributed on the road by tail-gate dumping of trucks in motion. A Caterpillar patrol grader with a 12-ft. blade ordinarily spread and struck off the first layer between the edge forms and the existing traffic-bound center strip. This layer was compacted only by the rolling action of the patrol grader and trucks, except where additional compaction was needed near the edge forms. In these places, a Huber 10-ton three-wheel gasoline roller compacted the first layer.

During the same day, material for the top layer was spread to a loose depth of about 4 in. near the two edges of the roadway and to a minimum depth of 3 in., loose measure, over the existing metal in the center of the road. For shaping this material, the contractor found the Caterpillar patrol grader to be an effective machine. On the final strike-off ahead of the roller, the patrol grader pulled a Gledhill road shaper, as illustrated by one of the photographs. Forms were lifted in advance of this planing and rolling. The road planer was used again for floating the surface ahead of the 10-ton roller after rains.

Newly completed sections of stabilized surface were sprinkled and rolled each evening. During the following days, rolling continued until the stabilized mixture set up hard. This process required rolling at five or six different times, depending upon the thickness of the stabilized material and the amount of traffic on the road.

Direction — Activities of the Michigan Highway Department are administered by Murray D. Van Wagoner, state highway commissioner. Harry C. Coons is deputy commissioner-chief engineer. Highway construction projects are under the general direction of J. G. Schaub, engineer in charge of field operations. On the Bartling & Dull contract, A. S. Taylor was project engineer in charge of the work for the State Highway Department.

For the Bartling & Dull Co., Pontiac, Mich., contractor, operations were directed by W. L. Eva, superintendent, assisted by Homer Shingledecker, foreman on surfacing. The stabilizer plant and truck fleet operated under the personal supervision of E. P. Brady, Flint, Mich.

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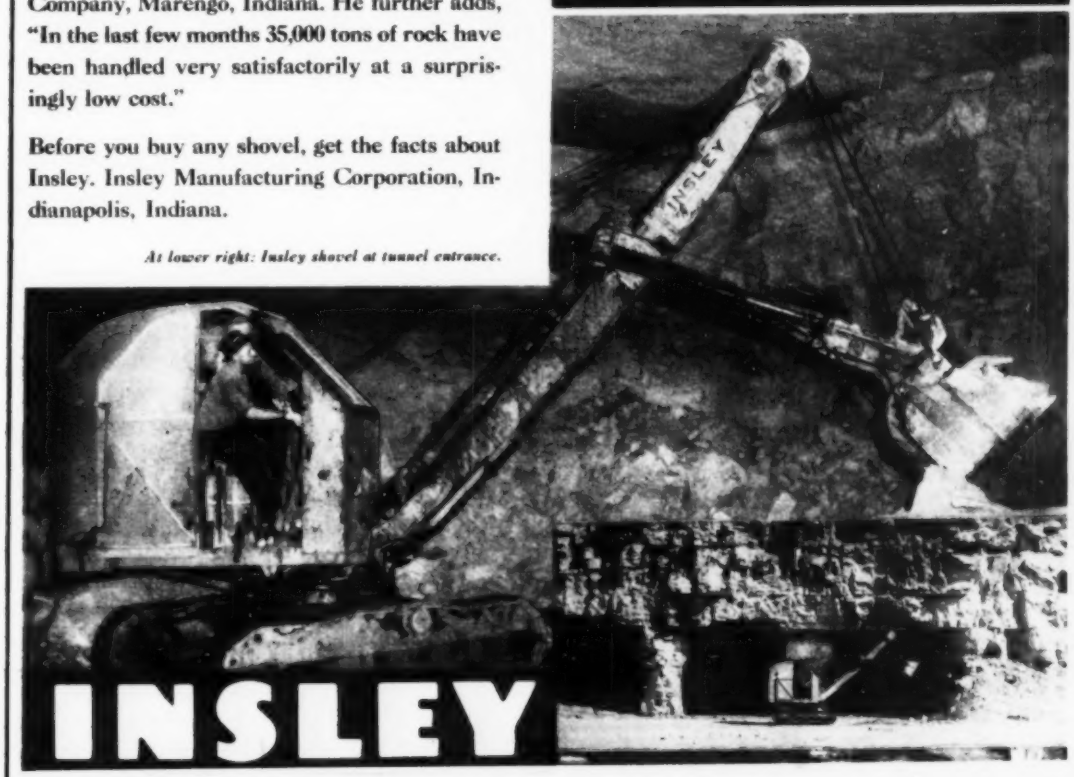
At lower right: Insley shovel at tunnel entrance.

Hard Going
300' inside tunnel



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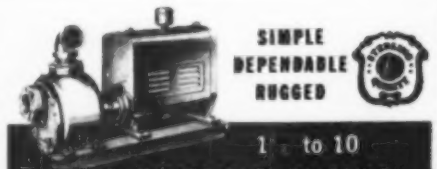

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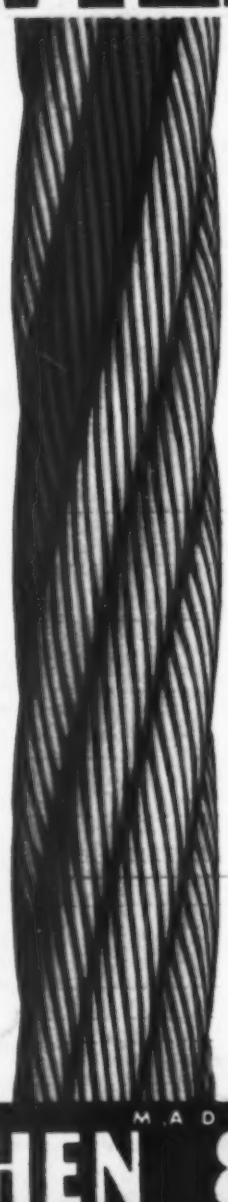

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